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THE NEW ENGLAND BOTANICAL CLUB

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THE EELGRASS SITUATION ON THE AMERICAN PACIFIC COAST

Clarence Cottam

Since the abrupt and unprecedented diminution of eelgrass on the Atlantic coast, numerous requests for information on the condition of eelgrass on the Pacific coast have been received. During the past few months printed reports have given evidence of a scarcity of this important submerged aquatic waterfowl food plant at a number of west coast bays. It was reported that this food scarcity was causing birds that normally remain in salt water to come inland to feed. Incidentally this has been a common occurrence along the east coast since the onset of the eelgrass scarcity. Until recently many have held that a Mycetozoan (*Labyrinthula*) was the organism responsible for the widespread wasting disease of the east coast eelgrass. Because ships commonly carry water as ballast, and because shellfish are frequently transplanted from the east to the west coast, it has been feared that the causative organism, if such existed, might inadvertently be introduced into these waters. Consequently with this feeling that there was a distinct possibility of the "wasting disease" developing on the west coast, it was felt that the recent reports of the Pacific eelgrass scarcity might be well founded; therefore, it was deemed advisable to obtain reliable information on the true status of the plant.

On July 21, in company with Mr. James Moffitt, of the California Academy of Sciences, the writer made an inspection of eelgrass conditions at Tomales Bay, Marin County, California. Many "slicks" were noted where the "grass" came to the surface of the water and

made it impossible for a motorboat to travel through it. Careful inspection was made of rhizomes of the plant as well as of those parts occurring above the surface of the mud. No characteristic spotting or streaking was noted on the underground parts or leaf blades, as is so common with the diseased eastern coast plants.

During the first week of July, Mr. T. H. Scheffer, retired associate biologist of the Biological Survey, made an inspection of conditions at Grays Harbor and Willapa Harbor, Washington, and reported that he could find no evidence that any disease has been or is affecting the eelgrass. From contact with a number of experienced and reliable oystermen who are constantly working along the coast he obtained complete confirmation of his findings. He writes further: "Everywhere along the coast reports of observers, whether scientifically inclined or not, indicate that there were unusually large flights of brant and geese the past spring, and that many flocks remained for extended periods. Naturally these waterfowl gathered in such numbers on the tide-land meadows as to attract attention, particularly at times when the eelgrass beds were less accessible on account of the higher tides. A case in point was the gathering of large flocks of brant on tide-land meadows that could be observed from the office of the South Bend Journal, where the report, of which you received a clipping, originated."

Reports of conditions along the coast of British Columbia have recently been received from Mr. J. A. Munro, Chief Federal Migratory Bird Officer, B. C., Dr. W. A. Clemens, Director, Pacific Biological Station, Nanaimo, B. C., and Dr. Irene Mounce, Assistant Plant Pathologist, Division of Botany, Department of Agriculture, B. C., Canada. Mr. Munro states that he "observed no reduction of eelgrass this spring while on Vancouver Island and found black brant in large numbers on their usual feeding grounds." Dr. Clemens writes as follows:

> "Although *Labyrinthula* has been identified from the eelgrass in Departure Bay, there is no evidence of a decrease in the amount of growth on the eelgrass beds at the present time. Furthermore last fall I requested the Department of Fisheries to ask the fishery inspectors along the coast to report on the grass beds of their respective districts and no reports indicated a lessened amount. We are watching the situation and so far there is no sign of an epidemic in the eelgrass beds along the Canadian coast."

Dr. Mounce writes under date of September 9, 1938 that she has recently made personal observation only at Royston, Vancouver Island, B. C., and concluded that "There seemed to be no noticeable change in the amount of grass" and that the people living along this coast concurred with this view. She added further that the amount present was "certainly as much as I remember some years ago." In September 1937 she also informed us that their department had no reports indicating "any decrease" in eelgrass at Departure Bay.

From Alaska, Regional Director Frank Dufresne indicates that eelgrass conditions are normal. His warden, Jack Benson, reports that eelgrass was noted in December 1937 (and apparently was in healthy condition) at Nelson Lagoon adjacent to Bering Sea. At a later date at Morjhovoi, Cold and Pavlof Bays, Alaska Peninsula, he found waterfowl and their food in abundance and adds that "an abundance of eelgrass was noted in many places along the Alaskan Peninsula."

We have no authentic data indicating any disease or reduction of eelgrass along the Pacific coast.

Dr. Harrison F. Lewis, Chief Federal Migratory Bird Officer of Ontario and Quebec, wrote under date of September 9, 1938 that he has observed no noticeable change in the scarcity of eelgrass along the north shore of the Gulf of St. Lawrence.

Concerning the condition on the English coast, Dr. A. D. Cotton of the Herbarium, Royal Botanic Garden, Kew, Surrey, England, informed us on August 26, 1938 that he "believed the situation is somewhat easier" than it has been in recent years.

Dr. F. Borgesen of the University Botanical Museum, København, Denmark, on September 5 of this year wrote that along their coast the eelgrass seems to be slowly recovering. He reports that at a number of localities he has found apparently healthy plants. At Hellebock (north of Elsinore) after a prolonged wind, he has for the first time since the outbreak of the disease, found a good deal of eelgrass drift.

Since our April summary of the eelgrass situation along the Atlantic coast (published as Leaflet BS–110, Status of Eelgrass (*Zostera marina*) on the North Atlantic Coast, February 1938) it may be stated that some improvement has been noted. A recent (July and August) inspection of eastern Maine indicates an encouraging improvement, although the disease is still in evidence. In general, areas of reduced

salinity are making a good return. The present condition lends encouragement to the hope that the devastating "disease" will eventually pass and that the west coast plants will not succumb to the malady.

U. S. Biological Survey, Washington, D. C.

ENVIRONMENTAL FACTORS AND THE WASTING DISEASE OF EELGRASS

Neil E. Stevens

The causes of the wasting of eelgrass (*Zostera marina*) on both sides of the Atlantic continue to be the subject of investigation and speculation. Workers in the United States and in Great Britain now appear to be in agreement that whatever parasite or parasites may be associated with the disease, we are (5 p. 68) "forced to look for an explanation of the wide-spread disappearance of *Z. marina* in the ecology of the plant itself," or as Young states (6 p. 25), "A universal shift of some one or more environmental factors upsetting the physiological balance of *Zostera* or of its parasite, *Labyrinthula*." The writers quoted differ, however, as to the particular environmental factors which they regard as the most likely to be significant. Young points out a possible relation between the "local variations" in the amount of eelgrass observed throughout the diseased areas and changes in the salinity. Tutin, on the (5 p. 68) other hand, relates the sudden widespread disappearance to the fact that "In the British Isles the year 1931–32 showed a sunshine deficiency of about 20% below normal, and no other year in the past ten showed a deficiency approaching this." Atkins has challenged the validity of this conclusion and after reviewing the percentage of normal sunshine at various stations in the British Isles since 1897, concludes that (1 p. 209), "There is certainly no ground for attributing its [Zostera's] disappearance to any decrease in illumination leaving the plant, thus weakened, an easier prey to disease."

Neither writer considers sunshine data from the United States. It should be remembered that the sudden wasting of eelgrass was a very widespread phenomenon, and that any environmental factor or factors, in order to be worth considering in this connection, must be shown to have prevailed over a very large area. Fortunately, the

United States Meteorological Yearbooks (and the reports of the Chief of the Weather Bureau) give the total sunshine for all first order stations including, of course, a number on the Atlantic coast. The writer has recently tabulated these figures for several widely separated stations. Prior to 1930–1931, eelgrass flourished along our Atlantic coast under rather widely varying sunshine conditions, as indicated in Table 1.

Table 1. Sunshine Data for Certain Atlantic Coast Stations

Station	Average Percent Possible	Approximate Hours Average	Departure of Percent Possible from Normal 1929	1930	1931	1932
Eastport, Maine	50	2232	+2	−3	−1	+3
Boston, Mass.	57	2541	+2	+3	+2	+3
New Haven, Conn.	60	2673	+2	+3	+1	0
Wilmington, N. C.	66	2934	−6	+2	+4	+2

The first column gives the average percentage of possible total sunshine for the 20-year period 1915–1934, inclusive; the second column the approximate average number of hours of sunshine. The succeeding columns give the departure of the percent possible from the normal for each of the "critical" years, considering as normal the average of the period 1915–1934.

If the figures are computed on the basis of the period for which the water temperatures (3 p. 28) are above 50° F., the minimum set by Setchell (4) for vegetative growth, the results are much the same. Table 2 gives the data for Boston for the periods June to October inclusive, for 1915 to 1937.

Table 2. Percentage possible sunshine, June to October inclusive, at Boston, Massachusetts. Departure from average of years 1915–1934.

Year	Departure	Year	Departure	Year	Departure
1915	+1	1923	−2	1931	−2
1916	+4	1924	+5	1932	+6
1917	+2	1925	−2	1933	−2
1918	−4	1926	−6	1934	−8
1919	−4	1927	+2	1935	−6
1920	0	1928	−3	1936	+2
1921	+8	1929	+5	1937	0
1922	−2	1930	+3		

Examination of this table shows that in 1929 and 1930 there were more than the normal number of hours of sunshine at Boston, Mas-

sachusetts and in 1931 only a slight deficiency. There were periods of deficiency in 1918, 1919, and 1926 when there was certainly no wasting of eelgrass in eastern Massachusetts. There was a decided deficiency in 1934 and 1935 when the plant was making a perceptible if slow recovery. The available information from the Atlantic seaboard of the U. S. A. certainly supports Atkins rather than Tutin.

The suggestion that variations in salinity may, through their effect on the development of the Labyrinthula, influence the wasting of eelgrass, would seem to warrant further study. According to Young (6), the optimum range is from 15 to 22 per mille chlorinity. Using the formula given by Johnstone (2 p. 137) for conversion, this equals 27.1 per mille to 39.74 per mille salinity. In this connection attention should be called to the fact that the salinity of surface waters of the Mediterranean (2 p. 142) is notably high, 37 to 39 per mille, and since, as Johnstone points out, this high salinity is due to very limited inflow of fresh water, there must be many places along its shores where salinity rises well above Young's minimum of 15°/₀₀. Yet, according to Tutin, no report of the wasting disease has come from the Mediterranean. This would seem to be the place for further investigation.

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CONTRIBUTIONS TO THE FLORA OF ALASKA

A. E. Porsild

(*Continued from p. 254*)

Viola biflora L.—Alaska Range: Broad Pass, rare in dry, open spruce woods, No. 70. Norton Sd.: volcanic hills back of Pastolik,

in fruit July 21, No. 921; volcanic hills back of Qiqertariaq, No. 1063; hills back of Unalaklet, No. 1158. SEWARD PEN.: Nome, Anvil Hill, No. 1408; Sawtooth Range, Grand Central Pk., *Thornton,* No. 177 (T). Rare or occasional in dry, open woods and willow thickets, perhaps limited to alpine regions.

V. biflora flowers very early and towards end of July has matured seed.

V. EPIPSILA Ledeb. *V. achyrophora* Greene, Pitt. **5**: 33 (1902).—KOKRINES MTS.: divide towards Melozitna R., in willow thickets by a stream, No. 764. NORTON SD.: volcanic hills back of Unalaklet, No. 1159. SEWARD PEN.: Nome, *Thornton,* No. 62 (T); north coast, Buckland R., No. 1594. Rare or occasional, in wet moss in alpine regions, perhaps throughout Alaska and the Yukon to the mouth of Mackenzie R.

Our material is very uniform and matches Ledebour's description. It also is a perfect match of *V. achyrophora* Greene, l. c., described from the Pribilof Islands, *J. M. Macoun,* No. 18.594 (Can).

V. LANGSDORFFII Fisch.—ALASKA RANGE: Richardson Highw., between Paxon and Summit, rare on wet sphagnous margins of ponds, in flower June 26, No. 559.

V. Langsdorffiii in Alaska belongs to the Pacific slope flora and apparently does not cross the divide.

ELAEAGNUS COMMUTATA Bernh. *E. argentea* Pursh, not Moench.—ALASKA RANGE: Nenana Valley, Lignite, No. 309. HEAD OF CHITINA R.: *H. M. Laing,* No. 146.

New to the flora of Alaska.

SHEPHERDIA CANADENSIS (L.) Nutt.—FAIRBANKS: No. 203. ALASKA RANGE: Nenana Valley, Lignite, No. 310; Richardson Highw., between Paxon and Summit, No. 558. HEAD OF CHITINA R.: *H. M. Laing,* No. 145. Occasional on calcareous soil in the interior.

CIRCAEA ALPINA L.—TANANA R.: Hot Springs, No. 656.

Previously known from the Aleutian islands and the south coast.

EPILOBIUM ANGUSTIFOLIUM L.—FAIRBANKS: College, No. 233. ALASKA RANGE: Richardson Highw., between Summit and McCarty, No. 435. HEAD OF CHITINA R.: *H. M. Laing,* No. 148. KOKRINES MTS.: divide towards Melozitna R., No. 766. NORTON SD.: Qiqertariaq, No. 1062. SEWARD PEN.: north coast, Kiwalik R., No. 1474 (the last two are var. INTERMEDIUM (Wormskj.) Fern.). Common throughout the region.

E. DAVURICUM Fisch.[1]—FAIRBANKS: in a muskeg, No. 196. ALASKA RANGE: Broad Pass, No. 71.

[1] The small-flowered species of *Epilobium* were determined by Prof. G. Samuelsson, Stockholm.

E. GLANDULOSUM Lehm.—TANANA R.: Hot Springs, Nos. 644 and 645.

In Alaska not recorded previously from north of 60°.

E. HORNEMANNI Rchb.—ALASKA RANGE: Nenana Valley, Healy, No. 359; Richardson Highw., Castner Glacier, No. 498; between Paxon and Summit, Nos. 551 and 552; Paxon, No. 581. SEWARD PEN.: Nome, No. 1374. Common on moist, alpine slopes of Alaska Range, rare or occasional in the Bering Sea region.

E. LATIFOLIUM L.—ALASKA RANGE: Nenana Valley, Healy, No. 360; Richardson Highw., between Paxon and Summit, No. 553; Paxon, No. 582 (var. ALBIFLORUM[1]). HEAD OF CHITINA R.: *H. M. Laing*, No. 147. KOKRINES MTS.: divide towards Melozitna R., No. 767. Common throughout the region, but in the interior perhaps restricted to alpine regions.

E. PALUSTRE L.—KOKRINES MTS.: divide towards Melozitna R., No. 765. YUKON DELTA: Kotlik, No. 873. NORTON SD.: Pastolik, No. 1006; Unalaklet, No. 1112; hills back of Unalaklet, No. 1157. SEWARD PEN.: Nome, No. 1373; Port Clarence, No. 1731; north coast, Buckland R., No. 1593. Common in muskegs and in wet tundra throughout the region, but in the interior perhaps restricted to alpine regions.

HIPPURIS TETRAPHYLLA L. fil.—NORTON SD.: brackish ponds near Pastolik, No. 1007; edge of brackish lagoon, Unalaklet, No. 1113.

Our material has ovate-lanceolate, fleshy leaves in verticels of 4 or 6 leaves and internodes much longer than in *H. vulgaris*. It well matches specimens from Finland, *e.g.* Pl. Finl. Exsicc. Nos. 1267 and 1268. According to Hultén, Fl. Kamtch. **3**: 153 (1929) *H. tetraphylla* has been collected previously in Alaska at Port Clarence.

H. VULGARIS L.—ALASKA RANGE: Broad Pass, No. 72. KOKRINES MTS.: divide towards Melozitna R., Nos. 768 and 769. YUKON R.: Holy Cross, No. 830. YUKON DELTA: Kotlik, No. 875; same place, No. 876. SEWARD PEN.: Nome, No. 1375; same place (f. FLUVIATILIS (Hoffm.) Coss. & Germ.), No. 1376; north coast, Kiwalik R., Nos. 1475 and 1476 (the last is f. FLUVIATILIS); Buckland R., No. 1599.

The first two numbers represent a curious form with a filiform, creeping and freely branching rhizome, with branches but 3 to 10 cm. long. It is not *H. montana* Ledeb. Common throughout the region, north at least to Kotzebue Sd.

MYRIOPHYLLUM ALTERNIFLORUM DC.—SEWARD PEN.: Buckland R., in shallow lake 1 to 2 ft. deep, No. 1600.

[1] EPILOBIUM LATIFOLIUM L. var. **albiflorum** (Nath.), n. comb. *Chamaenerium latifolium* (L.) Sweet var. *albiflora* Nath., Öfvers. Kgl. Sv. Vetensk.-Akad. Förh. 46 (1884); *Epilobium latifolium* L. ssp. *leucanthum* Ulke in Can. Field-Nat. **49**: 108 (1935).

Although our specimens are sterile they are placed here without much doubt because of the slender, almost filiform stems, long internodes and short leaves with capillary, strongly bent or reflexed segments. Hultén, Fl. Kamtch. **3**: 152 (1929), states that *M. alterniflorum* is not known to occur in Pacific North America, but recent discoveries in N. W. Mackenzie (*A. E. Porsild*, ined.) makes its occurrence in Alaska less unexpected.

M. EXALBESCENS Fern. in RHODORA, **21**: 120 (1919).—YUKON R.: Holy Cross, No. 829. YUKON DELTA: Kotlik, Nos. 877 and 878. NORTON SD.: Pastolik, No. 1008; Unalaklet, in a brackish lagoon, No. 1114. SEWARD PEN.: Port Clarence, *Fr. Johansen*, No. 564 (sterile fragments).

The first three numbers are in anthesis, while the rest are sterile. The large amount of material in the writer's collection from Alaska and N. W. Mackenzie in no respects differs from typical material from Eastern North America, whereas a single sheet in the National Herb. of Canada, from the Aleutian chain (Atka Isl., *Eyerdam*, No. 1282) by its rigid leaf-segments is a good match for Eurasian *M. spicatum*. The latter species according to Hegi, in Ill. Fl. v. Mittel-Europa, does not develop winter buds. In most of the material of *M. exalbescens* in the writer's collection well developed winter buds are present.

BUPLEURUM AMERICANUM Coult. & Rose, Rev. N. Am. Umbell. 115 (1888). *B. ranunculoides* L., Hook. Fl.-Bor. Am. **1**: 263 (1840); Kjellman, Vega Exp. Vetensk. Iakttag. **2**: 43 (1883).—ALASKA RANGE: Nenana Valley, Healy, No. 361; Richardson Highw., between Summit and McCarty, No. 433. KOKRINES MTS.: divide towards Melozitna R., Nos. 770 and 771. NORTON SD.: hills back of Pastolik, Nos. 920 and 920-A; hills back of Qiqertariaq, No. 1065. SEWARD PEN.: Nome, *Thornton* No. 418 (T). Common in dry, gravelly places, north to Seward Pen.

Coulter and Rose, l. c., cite a specimen said to have been collected by Capt. Hooper on Herald Island. The general distribution of the species strongly suggests that the above cited specimen came from somewhere else.

Hultén, Fl. Kamtch. **3**: 157 (1929), suggests that the Alaska plant is conspecific with the Asiatic *B. triradiatum* Adams, but the following passage in Ledebour's description (Fl. Ross. **2**: 264): "foliis radicalibus oblongis; caulinis oblongis ovatisve cordatis amplexicaulibus—" does not seem to make it possible to place the American plant there.

CICUTA MACKENZIEANA Raup in Journ. Arnold Arboretum, **17**: 279 (1936).—YUKON DELTA: Kotlik, No. 879. NORTON SD.: low tundra

at Pastolik, No. 1011. Seward Pen.: north coast, Buckland R., No. 1601. Apparently occasional in low, marshy tundra and on margins of lakes throughout northern Alaska, Yukon and the Northwest Territories, east to Hudson Bay and north to the Mackenzie Delta.

Cicuta mackenzieana, described from Lake Athabasca of N. W. Canada, no doubt is closely related to *C. virosa* of the Old World, which in Alaska barely enters the N. American continent. It differs from that species chiefly by its much narrower, subentire leaf-segments and by its slightly smaller flowers and fruit. *C. mackenzieana* in Alaska grows in water from a few inches to two feet deep; as in *C. virosa* the root is long-fusiform, hollow and septate, with numerous verticils of fibrous roots from the lower nodes of the stem.

The reindeer in Alaska eagerly, and apparently with impunity, eat the stem and leaves of *C. mackenzieana*. An instance of fatal poisoning in the case of an Eskimo child, from the eating of the root, was reported from near St. Michaels during the time of the writer's visit. *Cicuta mackenzieana* is new to the flora of Alaska.

Cicuta virosa L. *C. purpurea* Greene, Pitt. **2**: 8 (1889) saltem quoad pl. Alaskana; ? *C. Douglasii* (DC.) Coult. & Rose in Contr. U.S. Nat. Herb. **7**: 95 (1900).—Tanana R.: Hot Springs, No. 646. New to the flora of central Alaska.

Ligusticum Hultenii Fern. in Rhodora, **32**: 8, tab. 194 (1930). *L. scothicum* auctt. Fl. Am. bor. occid. et As. orient. non L.—Norton Sd.: Qiqertariaq, No. 1087. Seward Pen.: south coast, Bluff, No. 1264. Common on sea-beaches of the Bering Sea coasts, north to Kotzebue Sd.

L. Macounii Coult. & Rose in Contr. U. S. Nat. Herb. **1**: 289, tab. 23 (1893); *iidem*, Contr. U. S. Nat. Herb. **7**: 139 (1900).—Kokrines Mts.: divide towards Melozitna R., No. 773. Norton Sd.: hills back of Pastolik, No. 919; volcanic hills back of Qiqertariaq, No. 1064. Seward Pen.: Nome, Mt. Tumit, 1500 feet elev., *Thornton*, No. 429 (T).

Coulter & Rose, l. c., describe the flowers and fruit as purple or dark purple, which is correct during the early stages of anthesis and fructification, when, also, the involucels, involucre and scapes are dark-tinged with anthocyanin. Towards maturity the coloring disappears and the mature mericarps are straw-colored. In the co-type, Cape Vancouver (south of the Yukon delta), *J. M. Macoun*, No. 20.447 (Can) this change has taken place in a few of the mericarps. The strongly nerved, white hyaline-margined stipules persist for many years.

This plant, hitherto known from the type locality only, is rare or occasional in dry, gravelly places in the mountains of the Bering Sea region, where it is nearly always found associated with *Cetraria nivalis*.

From the Chuck peninsula is reported the very closely related *L. mutelloides* ssp. *alpinum* (Ledeb.) Thellung (*Pachypleurum alpinum* Ledeb., Fl. Alt. **1**: 397), which differs in having the basal leaves doubly pinnate-dissected and by having but a single cauline leaf.

Coelopleurum Gmelini (DC.) Ledeb.—Kokrines Mts.: divide towards Melozitna R., No. 772. Norton Sd.: low tundra, Pastolik, No. 1012; Qiqertariaq, No. 1089. Seward Pen.: Nome, *Thornton*, Nos. 5 and 189 (T). Occasional in moist places, often near running water, north to Kotzebue Sd.

The plant recorded by Eastwood (p. 208) as *Heracleum lanatum* from Seward Pen. probably belongs here. Records of *Angelica* (or *Archangelica*) *officinalis* from N. W. Alaska (Kjellman p. 43; Rothr. p. 447) no doubt also belong here (see also Hultén 1936). The last mentioned writer remarks that in the Aleutian islands the young leaf-stalks, like those of *Angelica officinalis* of Northern Europe, are eaten by native children. The writer tasted the stalks of *Coelopleurum Gmelini* wherever met but always found the flavor disagreeable.

Conioselinum **cnidiifolium** (Turcz.), n. comb. *Selinum cnidiifolium* Turcz. in Bull. Soc. Natur. de Mosc. 72 (1840); Ledebour, Fl. Ross. **2**: 293 (1844); Kjellman, Vega Exp. Vetensk. Iakttag. **2**: 43 (1883); Steffen, Bot. Centralbl. **54**, B: 553 (1936); *Conioselinum Dawsoni* (Coult. & Rose) Coult. & Rose in Contr. U. S. Nat. Herb. **7**: 152 (1900); ? *C. Fischeri* Hook., Fl. Bor.-Am. **1**: 266 non Wimm. & Grab.—Alaska Range: Richardson Highw., between Summit and McCarty, No. 434. Seward Pen.: south coast, Bluff, No. 1263. Common in sandy places such as riverbanks, margins of lakes and seashores throughout the region east to Cape Bathurst (long. 128° W.).

Ostenfeld (Gjöa Exp. 58) has already pointed out that there is little doubt but that the American plant, described by Coulter & Rose, l. c., as *C. Dawsoni* from Pelly R., Yukon Territory (*Dawson* No. 23), of which the co-type is preserved in the National Herbarium of Canada (No. 9292), is conspecific with *Selinum cnidiifolium* Turcz., from E. Siberia "inter Jakutzk et fl. Aldan"; and it is obvious that Coulter and Rose, l. c., overlooked the fact that it had been recorded from America (Port Clarence, Alaska) by Kjellman. Ostenfeld, l. c., who did not have mature fruit, considered the species best left in the genus *Selinum* because "it has oil tubes single in the intervals and two

oil tubes on the commissural side" and because he found the lateral wings "not being considerably broader than the dorsal. The fruit—at least the immature one—is not dorsally flattened."

With the abundant material now available, from Alaska, Yukon Territory and from northwestern Mackenzie district, and with abundance of mature fruit, it is obvious that the mature carpels are decidedly flattened. The lateral ribs are one and one-half times as wide as the prominent dorsal ones. The oil-tubes on the other hand are very prominent, and, as in *Selinum* of the Old World, in fresh material at least are visible from the ouside. There are two on the commissural side, but often five on the dorsal side.

The broad, membranaceous-margined involucels, ending abruptly in a prominent attenuation, as described by Turczaninow, Coulter and Rose and Ostenfeld, are very characteristic in the large amount of material on hand. In the young umbels the involucels and petals are often purplish-tinged with anthocyanin, but soon become white. The flowers are strongly protandrous. In the unopened flower the filaments are abruptly bent, with the anther resting against the pistil. In this stage the tip of the petals is depressed and almost completely envelops the anther.

If the genus *Selinum* is to be excluded from the flora of North America, as is done by Coulter and Rose, in which they are followed in such modern treatments as Thellung's in Hegi, Ill. Flora v. Mittel-Europa, our plant must be transferred to *Conioselinum*.

C. Benthami (Wats.) Fernald in Rhodora, **28**: 221 (1926). *Selinum Benthami* Wats., Bibl. Ind. 432 (1878). *Ligusticum Gmelini* Cham. & Schlecht. in Linnaea, **1**: 391 (1826), as to plant (of Unalaska, Bay St. Lawrence, etc.) described, not as to Gmelin plate cited. *C. Gmelini* (Cham. & Schlecht.) Coult. & Rose in Contrib. U. S. Nat. Herb. **7**: 150 (1900), not Steud. (1840). For discussion of nomenclature see Fernald, Rhodora, l. c.—Norton Sd.: Qiqertariaq, in moist sandy places, No. 1088.

According to Hooker & Arnott in Bot. Beech. Voy. **1**: 124 collected by Messrs. Lay & Collie in Kotzebue Sd. but, as Hooker later, in Fl. Bor.-Am. **2**: 266, under *C. Fischeri* definitely confused *C. Benthami* with *C. cnidiifolium*, the record needs verification.

Professor Fernald supplies the following memorandum upon the conflicting nomenclature of *Conioselinum Gmelini*. "In his Flora Sibirica **1**: 195 (1747) Gmelin had an *Angelica foliis pennatifidis*, described as growing 'in omni Sibiria' and illustrated by a life-size

plate (xliv). Bray in Denkschr. Bot. Ges. Regensb. 1. pt. 2: 36 (1818), in a paper on new and rare plants of Livonia, described in detail as new *Selinum Gmelini*, but citing also the Gmelin description and plate. Since Gmelin's plant was not published with a binomial and was pre-Linnean it has no status under binomial nomenclature unless it alone is the basis of a binomial, and it should not be given preference over the actual Livonian material which Bray had before him. *S. Gmelini* Bray (1818) is the characteristic plant of northern and eastern Europe now placed in *Conioselinum*.

"In 1826 Chamisso & Schlechtendal described a quite different species from the Bering Sea region as *Ligusticum Gmelini* Cham. & Schlecht. in Linnaea, 1: 391 (1826), describing in detail the actual plant of Unalaska and the Bering Sea coasts, but, like Bray, also citing the Gmelin *Angelica foliis pennatifidis*. There was already a *Ligusticum Gmelini* Villar, Prosp. 24 (1779), therefore Chamisso & Schlechtendal's name was illegitimate, as a later homonym. However, Steudel, with unexcelled impartiality, took up all the elements (except that of Villar) as belonging about equally to two different species. In his Nomenclator, ed. 2: 403, 404 (1840) Steudel first placed under *Conioselinum Fischeri* Wimm. & Grab. (1827) of 'Sibir. Tart. Siles.' all three synonyms: 'C. Gmelini. *Bray.* ?' (thus coining a new but perhaps unintentional combination in synonymy), followed by several other synonyms, including 'Ligusticum Gmelini *Cham. Schlecht.*' and 'Angelica nr. 10. *Gmel.* sibr.' But two species further down in Steudel we get again the new combination *C. Gmelini* Steud. (this time properly made for a plant said to be of Siberia), again with the same three synonyms, except that no doubt is expressed as to *Selinum Gmelini* of Bray. Since the latter was the earlier of the two binomials, *Selinum Gmelini* Bray (1818) and *Ligusticum Gmelini* Cham. & Schlecht. (1826) (this an illegitimate name), we must accept *Conioselinum Gmelini* (Bray) Steud. as the well known plant of northern Europe.

"That, however, is not the end of the matter. In 1900 Coulter & Rose made another *Conioselinum Gmelini* (Cham. & Schlecht.) Coult. & Rose, based on the illegitimate *Ligusticum Gmelini* Cham. & Schlecht. (1826), for the plant of the Bering Sea region. Obviously, they could not, under the rules, give the name *C. Gmelini* to a second species the more so since this second and illegitimate combination was itself based on an illegitimate name. *Selinum Benthami* Wats. (1878) had been

properly published and should have been made the basis of a new combination, which Coulter & Rose did not make."

Heracleum lanatum Michx.—Alaska Range: Richardson Highw. between Paxon and Summit, Nos. 554 and 555. Common in moist, alpine slopes of the Alaska Range north to the divide where it attains a height of six feet or more.

The record from Seward Pen. (Eastwood p. 208) probably should be referred to *Coelopleurum Gmelini*. The strong aromatic odor, suggestive of celery salt, is very noticeable in all parts of the plant when dry. In herbarium specimens 60 years old the odor is still quite noticeable.

Cornus canadensis L.—Fairbanks: Goldstream Cr. and Pedro Dome, No. 143. Head of Chitina R.: *H. M. Laing*, No. 149. Kokrines Mts.: divide towards Melozitna R., No. 777. Rare or occasional in open woods of the interior.

C. canadensis L. var. intermedia Farr. in Contr. Bot. Lab. Univ. Pa. **2**: 423 (1904). *C. unalaschkensis* Ledeb., Fl. Ross. **2**: 378 (1844); *C. canadensis* L. × *suecica* L., Hult. Fl. Aleut. 253 (1937).—Kokrines Mts.: divide towards Melozitna R., No. 778. Head of Chitina R.: *H. M. Laing*, No. 149.

This puzzling plant apparently is not uncommon throughout central Alaska and Yukon. As pointed out by Hultén, l. c., it seems to be intermediate between *C. canadensis* and *C. suecica* and, according to him, is merely a hybrid. Where the two species occur together, as is the case in S. W. Alaska and Atlantic North America, the hybrid-origin of our plant at first appears reasonable; but, as pointed out to the writer by Professor Fernald, it is decidedly open to question when the general distribution of the two hypothetical parents is taken into consideration. In America *C. suecica* is restricted to a comparatively small area in western Alaska and to an equally restricted area in the East, centering around southern Labrador and the Gulf of St. Lawrence. *Cornus canadensis* L. var. *intermedia* is common or occasional not only in boreal parts of Alaska, Yukon and Eastern America but also in mountains of British Columbia and Alberta, more than a thousand kilometers from the nearest station of *C. suecica*.

C. stolonifera Michx. var. Baileyi (Coulter & Evans) Drescher. —Tanana R.: in thickets along riverbank at McCarty, near the confluence of Delta R., No. 377. Yukon R.: between Ramparts and Tanana, *L. J. Palmer*, No. 48.

The young branches and pedicels are covered with a densely matted brown tomentum.

C. SUECICA L.—ALASKA RANGE: Broad Pass, No. 73. SEWARD PEN.: Nome, Anvil Hill, No. 1377; north coast, Buckland R., No. 1602. Common in dry tundra in the Bering Sea region, north to Kotzebue Sd.

MONESES UNIFLORA (L.) Gray.—FAIRBANKS: in a muskeg, No. 201. ALASKA RANGE: Broad Pass, No. 76; Nenana Valley, Healy, No. 362; Richardson Highw., between Summit and McCarty, No. 436 (var. RETICULATA). HEAD OF CHITINA R.: *H. M. Laing*, No. 150. YUKON R.: Birches, No. 609 (var. RETICULATA). KOKRINES MTS.: 800 ft. elevation, No. 678. NORTON SD.: wooded hills back of Unalaklet, No. 1160 (transitional to var. RETICULATA). A common woodland species of the interior, rare or occasional in the Bering Sea region, north to Norton Sd. Not previously recorded from north of the Pacific coast.

The var. *reticulata* (Nutt.) Blake in RHODORA, **17**: 28 (1915), as pointed out by Blake, because of the numerous intermediate forms between it and the species is best treated as a variety. Although it appears to be a strictly western form, the writer has seen a single collection from the Gulf of St. Lawrence, St. Paul Isl., *Perry & Roscoe*, No. 300 (Can).

PYROLA ASARIFOLIA Michx. var. INCARNATA (DC.) Fern.—FAIRBANKS: in wet, alluvial clay by a stream, specimens not yet in flower on June 14, No. 198. ALASKA RANGE: Richardson Highw., between Summit and McCarty, flowering specimens from sunny slope among willows, June 28, No. 437. SEWARD PEN.: north coast, Kiwalik R., No. 1477.

The specimens in the last mentioned number are sterile and when collected did not appear to have flowered that season. Because of the orbicular-reniform leaves and the dilated petioles they are placed here. A southern woodland species, rare or occasional in the interior lowland, also known from the Pacific coast and central Yukon Territory.

PYROLA CHLORANTHA Sw.—FAIRBANKS: in wet alluvial clay near a stream, flowers just opening on June 14, No. 199. HEAD OF CHITINA R.: *H. M. Laing*, No. 154. A woodland species, rare or occasional in central Alaska.

Apparently new to the flora of Alaska.

P. GRANDIFLORA Radius, Diss. Pyrola 27 (1821). *P. rotundifolia* var. *pumila* Hornem., Dansk Oecon. Pl. ed. 3, 463 (1821); *P. groenlandica* Hornem., Fl. Dan. tab. 1817 (1840); ? *P. occidentalis* R. Br. in D. Don, Mem. Wern. Soc. **5**: 232 (1824).—ALASKA RANGE: Broad Pass, common locally on alpine slopes in open spruce and birch woods, flowering on June 8–11, No. 74. SEWARD PEN.: Nome, *Thornton*, No. 326 (T). NORTH COAST OF ALASKA: Camden B., *Can. Arct. Exp.* No.

33. In central Alaska perhaps limited to high mountains; common on the arctic coast, elsewhere perhaps replaced by the var. *canadensis*.

P. grandiflora in arctic and boreal North America has from time to time been confused with forms of *P. asarifolia* and its var. *incarnata* (*P. uliginosa*) and with forms of *P. rotundifolia*.[1] In life these species are very easily distinguished but in the herbarium are sometimes hard to separate. The writer has found in the color of the anthers a character which appears constant and which has the advantage of being easily observed. In all phases of *P. grandiflora* the anthers are bright lemon-yellow; in *P. asarifolia* and its var. *incarnata* they are deep purplish-red, while in all phases of *P. rotundifolia* known to the writer the anthers are of a deep golden-yellow. The *P. grandiflora* complex may further be separated from the others by the thin, translucent and strongly veined petals. In life the petals of *P. grandiflora* and its varities are of a creamy white, often tinged with pink, but never pure white nor fleshy as in *P. rotundifolia*, nor the deep pink or crimson of *P. asarifolia*. In all shades the veins are conspicuous. In drying, the petals as a rule turn dirty reddish-brown, but always leave a conspicuous pale, whitish margin. This character has been found constant in the several hundreds of sheets examined. In *P. asarifolia* and *P. rotundifolia* the petals are thick and opaque, not conspicuously veined and always without a pale margin.

P. grandiflora in the east presents no problems but from the west have been described several closely related species: *P. canadensis* Andres (*P. borealis* Rydb.), *P. Gormanii* Rydb. and *P. occidentalis* R. Br. Typical material of the first two is easily distinguished from *P. grandiflora*, but on account of the numerous transitional forms present when a large amount of material is examined it seems best to treat these as geographical varieties or races of the circumpolar *P. grandiflora*. The var. *canadensis* is common in Alaska, Yukon and N. W. Canada and the writer is well acquainted with it from studies in the field; of the var. *Gormanii*, in addition to the type, he has seen but few collections. Of *P. occidentalis* he has seen no authentic material. Andres, in Allgem. Bot. Zeitschr. **19**: 82 (1914), has shown that it is not, as suggested in Gray's Syn. Fl., a variety of *P. chlorantha*. From the description in Hook. Fl. Bor.-Am. **2**: 47 (1840) and the distribution (the type came from Seward Pen.) the writer thinks it merely a thin-leaved form of *P. grandiflora*.

[1] For a discussion of *P. grandiflora* in Greenland and eastern arctic Canada see M. P. Porsild in Medd. om Grønl. **58**: 117 (1920) and M. O. Malte in Rhodora **36**: 182 (1934).

The relationship to the species of these two little known varieties is exemplified in the following table:

	var. TYPICA	var. CANADENSIS	var. GORMANII
leaf:	orbicular to ovate-acute, entire	orbicular, entire	ovate-acute, denticulate by excurrent veins
petiole:	equalling blade	longer than blade	equalling blade
scape including inflorescence:	rarely exceeding 15 cm., pink	rarely less than 20 cm., green	rarely exceeding 15 cm., pink
inflorescence:	short, with few and large flowers, of 2.0–2.5 cm. diam.	long, with many small flowers, these rarely over 1.5 cm. diam.	short, with few and large flowers
sepals:	lanceolate, erose at apex	deltoid, entire	deltoid, entire
filaments:	strongly dilated below middle	filiform, not conspicuously dilated	filiform, not conspicuously dilated
style:	stout, thickened both ways	filiform, barely thickened above	filiform, thickened above
scent:	strongly perfumed	odorless	perfumed

It will be noticed from the table that the var. *Gormanii* is closer to the species than is var. *canadensis*.

P. GRANDIFLORA Radius var. **canadensis** (Andres), n. comb. *P. canadensis* Andres in Oest. Bot. Zeitschr. **63**: 250 (1913); *P. borealis* Rydb. in N. Am. Fl. **29**, 1: 24 (1914); *P. asarifolia* Michx. var. *incarnata* sensu Raup, Journ. Arnold Arb. **17**: 283 (1936) non DC. (in part).—FAIRBANKS: in a muskeg, flowering specimens, June 14, No. 197; College, No. 234. HEAD OF CHITINA R.: *H. M. Laing*, No. 152. KOKRINES MTS.: divide towards Melozitna R., No. 774. SEWARD PEN.: Buckland R., fruiting specimens, No. 1603. Common throughout wooded parts of the region; rare or occasional in willow thickets of the Bering Sea region, north to Kotzebue Sd. Common also through the Yukon Territory east to Bear Lake, north to the Mackenzie Delta and south to northern B. C.

Not previously recorded from Alaska.

In addition to the large series in the writer's collection from N. W. Mackenzie district, the following numbers, all in the National Herbarium of Canada, should be referred to the var. *canadensis:* N. W. T.: Mackenzie R., Bear Rock, Ft. Norman, *Hume*, No. 103.428. SLAVE LAKE: Ft. Rae, *Russell*, No. 10; *Brooke*, No. 12; *Seton & Preble*, No. 78.347. SLAVE R.: Ft. Smith, *Taylor*, No. 15.793. WOOD BUFFALO PK.: Caribou Mts., *Raup*, No. 2959; Pine Lake district, *idem*, Nos. 2956–7 (the last three distributed as *P. asarifolia* var. *incarnata*).

P. GRANDIFLORA Radius var. **Gormanii** (Rydb.), n. comb. *P. Gormanii* Rydb. in N. Am. Fl. **29**, 1: 24 (1914).—HEAD OF CHITINA R.: moist woods, 2000 feet elevation, *H. M. Laing*, No. 153.

Previously known only from the type collection: Yukon Terr.: Dry Gulch, *Gorman*, No. 1029 (in part) (NY, Can). New to the flora of Alaska.

P. minor L.—Alaska Range: Richardson Highw., between Paxon and Summit, rare on sandy mountain slope, flowering specimens on June 26, No. 556. Kokrines Mts.: divide towards Melozitna R., willow thickets on river flat, Nos. 775 & 776. Rare or occasional and, as elsewhere, of strangely disrupted range.

In Alaska not previously recorded from north of the Pacific coast.

P. secunda L.—Head of Chitina R.: *H. M. Laing*, No. 151.

A woodland species not previously recorded from Alaska.

P. secunda L. var. obtusata Turcz.—Fairbanks: in a muskeg, No. 200. Alaska Range: Broad Pass, flowering specimens on June 8–11, No. 75. Yukon R.: Birches, No. 610. Norton Sd.: tundra ridges at Pastolik, No. 1013. Rare or occasional in dry spruce woods of the interior, where it appears to be much less common than in corresponding parts of northern Canada; apparently rare in the Bering Sea region, in favored habitats north to Kotzebue Sd., Eschscholtz B. (*Chamisso*).

The var. *obtusata* Turcz., although it differs from the species only in vegetative characters, seems quite distinct:

	var. obtusata	var. typica
leaves:	elliptic-orbicular, pale yellowish-green, dull, 1.5 x 1.0 cm.	elliptic-lanceolate, acuminate, dark olive-green, 3.0 x 1.5 cm.
stem:	short, few-leaved	elongated, ± trailing, leafy
raceme:	few-flowered, short	many-flowered, long

The var. *obtusata* in its distribution is circumpolar; it is a characteristic plant of northern coniferous forests, but in N. America reaches far north of the tree limit.

Ledum decumbens (Ait.) Small.—Alaska Range: Broad Pass, No. 78. Seward Pen.: Nome, *Thornton*, No. 488 (T); north coast, Buckland R., No. 1608. An arctic species common in the Bering Sea region; in the interior limited to high mountains or to cold muskeg bogs of the lowland.

L. groenlandicum Oeder.—Fairbanks: College, No. 235. Head of Chitina R.: *H. M. Laing*, Nos. 156 and 157. Common in the interior in cold woods and in muskegs.

Rhododendron kamtchaticum Pall. ssp. glandulosum (Standl.) Hultén, Fl. Kamtch. **4**: 15 (1930). *Therorhodium glandulosum* Standl. in N. Am. Fl. **29**, 1: 45 (1914).—Seward Pen.: Nome, Anvil Hill, No. 1378; *Thornton*, Nos. 24, 163 and 397 (T); Port Clarence, *Walpole*,

No. 1725 (US). The last mentioned number is the type of ssp. *glandulosum*. Occasional on dry mountain slopes of Seward Pen.

Rh. lapponicum (L.) Wahlenb.—Alaska Range: Broad Pass, No. 79. Seward Pen.: Nome, *Thornton*, Nos. 162 and 494 (T). Common on dry mountain slopes of the Bering Sea region; in the interior perhaps limited to alpine regions.

Loiseleuria procumbens (L.) Desv.—Fairbanks: Goldstream Cr. and Pedro Dome, No. 144. Alaska Range: Broad Pass, No. 80. Seward Pen.: Nome, *Thornton*, Nos. 24, 183, and 488 (T); north coast, Buckland R., Clem Mt. No. 1610. Rare or occasional; on acid, crystalline rock only.

Cassiope tetragona (L.) D. Don.—Head of Chitina R.: *H. M. Laing*, Nos. 163 and 164. Kokrines Mts.: divide towards Melozitna R., No. 782. Seward Pen.: Nome, *Thornton*, Nos. 75 and 494. Diomede Isl.: No. 1715. Common everywhere in the Bering Sea region; in the interior on high mountains only.

Andromeda Polifolia L.—Alaska Range: Broad Pass, No. 81; mountains between Healy and Moody Creeks, No. 266; Richardson Highw., between Paxon and Summit, No. 557. Head of Chitina R.: *H. M. Laing*, No. 165. Seward Pen.: south coast, Bluff, No. 1272; Nome, No. 1379; north coast, Buckland R., No. 1607. Common in muskegs and tundra throughout the region.

Chamaedaphne calyculata (L.) Moench.—Fairbanks: Smith Lake, No. 598. Seward Pen.: north coast, Buckland R., No. 1606. Common in muskegs and cold woods of the interior. In the Bering Sea region north to Kotzebue Sd. but apparently always at a considerable distance from the sea-coast.

Arctostaphylos alpina (L.) Spreng.—Fairbanks: Goldstream Cr. and Pedro Dome, No. 146. Alaska Range: Broad Pass, No. 82-A. Seward Pen.: Port Clarence, No. 1442; north coast, Kiwalik R., No. 1478. Common in the Bering Sea region chiefly on acid, crystalline rock.

A. rubra (Rehd. & Wils.) Fern. See Rhodora, **16**: 32 (1914).—Alaska Range: Broad Pass, No. 82. Head of Chitina R.: *H. M. Laing*, Nos. 158–160. Occasional on calcareous soil in mountains of the interior.

A. Uva-Ursi (L.) Spreng.—Alaska Range: Richardson Highw., between Summit and McCarty, No. 438. Head of Chitina R.: *H. M. Laing*, Nos. 161 and 162. Kokrines Mts.: divide towards Melozitna R., No. 779. Occasional in calcareous soil on dry mountain slopes of the interior.

The report by Rothrock from Seward Pen. needs confirmation.

Oxycoccus microcarpus Turcz. See Porsild in Can. Field-Nat. **52**: 116–117 (1938).—Alaska Range: Broad Pass, No. 84; mountains between Healy and Moody Creeks, above timber line, No. 267; Richardson Highw., Paxon, No. 583. Norton Sd.: Unalaklet, No.

1161. Seward Pen.: north coast, Buckland R., No. 1605. Common in sphagnum bogs.

Vaccinium cespitosum Michx.—Alaska Range: Richardson Highw., Castner Glacier, No. 500.

The reports from the north coast of Alaska, by Macoun and Holm, from Camden Bay, Can. Arct. Exp. No. 7, as well as from Herschel Isl., No. 551, are based upon sterile specimens of *Salix phlebophylla*. The species does not otherwise appear to have been recorded from north of Sitka.

V. uliginosum L. var. alpinum Big.—Head of Chitina R.: *H. M. Laing*, Nos. 167–168. Common throughout, but in the interior perhaps not general except on higher mountains.

In the Bering Sea region the fruit is gathered in large quantities, shortly before the snow covers the ground. The berries are placed in a barrel and permitted to ferment. The dark purplish rather vile-tasting product is much relished locally.

V. Vitis-Idaea L. var. minus Lodd.—Fairbanks: Goldstream Cr. and Pedro Dome, No. 145; College, No. 236. Alaska Range: Broad Pass, No. 83. Head of Chitina R.: *H. M. Laing*, No. 166. Kokrines Mts.: divide towards Melozitna R., No. 780. Seward Pen.: north coast, Kiwalik R., No. 1479; Buckland R., No. 1604. Diomede Isl.: No. 1716. Common in muskegs throughout the region.

Diapensia obovata (Fr. Schm.) Nakai. See Porsild in Trans. Royal Soc. of Can. ser. 3, sect. 5, **32**: 35 (1938). Alaska Range: Broad Pass, No. 85; Healy, *J. P. Anderson*, No. 1848 (NY). Kokrines Mts.: divide towards Melozitna R., No. 781. Seward Pen.: Nome, *Thornton*, No. 74 (T); north coast, Buckland R., No. 1611. Diomede Isl.: No. 1717. Rare or occasional on acid crystalline rock. All material of *Diapensia* from Alaska-Yukon, seen by the writer, belongs to *D. obovata*.

Primula borealis Duby.—Kokrines Mts.: No. 679. Norton Sd.: Pastolik, No. 1014; Qiqertariaq, wet meadows, No. 1091. Seward Pen.: Nome, No. 1382-A. Perhaps common throughout, but in the interior restricted to alpine regions.

Pr. cuneifolia Ledeb. ssp. saxifragifolia (Lehm.) Hultén.—Norton Sd.: Golofnin B. wet meadow near lagoon, No. 1173.

Our specimens are one-flowered, the pedicels are minutely pubescent, the leaves fleshy, cuneate-spathulate. Rare or occasional in the Bering Sea region, north to Kotzebue Sd.

Pr. egaliksensis Wormskj.—Alaska Range: mountains between Healy and Moody creeks, No. 269; Nenana Valley, Lignite, No. 311. Moist, calcareous soil of alpine regions of the interior.

Not previously recorded from north of the Aleutian chain and the south coast.

Pr. eximia Greene. See Hultén, Fl. Kamtch. **4**: 50 (1930).—Diomede Isl.: No. 1718. Common on islands of Bering Sea.

In addition the writer has seen a sheet from mountains of Yukon: 63° 50′ N. 141° W. *D. D. Cairnes,* No. 93.324, which undoubtedly belongs here.

Pr. incana M. E. Jones.—Richardson Highw.: Tanana R., near junction of Delta R., springy places in poplar woods, No. 378.

New to the flora of Alaska.

Pr. sibirica Jacq.—Norton Sd.: Qiqertariaq, wet meadows, No. 1090. Seward Pen.: Nome, wet meadow by Dexter Cr., No. 1383.

No previous records from north of Kuskokwim R.

Pr. stricta Hornem.—Seward Pen.: Nome, wet meadows by Dexter Cr. Nos. 1381 and 1382; Port Clarence, No. 1445. Rare or occasional in the Bering Sea region north to Wainwright Inlet (Seem.).

Douglasia arctica Hook., Fl. Bor.-Am. **2**: 120 (1840).

The writer has seen a sheet, collected by the U. S. Polar Expedition in "Bering Strait," labelled *Androsace arctica* Cham. & Schlecht (NY). According to Hultén in Sv. Bot. Tidskr. **30**, 3: 528 (1936) known from St. Lawrence Island; otherwise known only from mountains and sea-coast west of Mackenzie delta.

Androsace Chamaejasme Host var. arctica R. Knuth in Engler, Pflanzenr. **4**, 22: 190 (1905).—Alaska Range: Broad Pass, No. 62-A; mountains between Healy and Moody creeks, No. 268; Nenana Valley, Healy, No. 365. Yukon R.: between Ramparts and Tanana, *L. J. Palmer,* No. 44. Seward Pen.: south coast, Bluff, No. 1266; Nome, No. 1380; Port Clarence, No. 1443. Common in sandy and gravelly places on calcareous soil; in the interior restricted to alpine regions.

A. septentrionalis L. s. lat.—Alaska Range: Nenana Valley, Healy, by a cold spring, No. 364. Head of Chitina R.: *H. M. Laing,* Nos. 170–172. Seward Pen.: south coast, Bluff, No. 1267; Port Clarence, No. 1444.

In Alaska apparently a less common species than in corresponding parts of N. W. Canada.

Lysimachia thyrsiflora L.—Fairbanks: Smith Lake, No. 603. Yukon R.: Holy Cross, No. 832.

Apparently new to the flora of Alaska.

Trientalis europaea L. ssp. arctica (Fisch.) Hultén; see his Fl. Kamtch. **4**: 56–59 (1930).—Fairbanks: *Picea* swamps, No. 202-A.

Alaska Range: Broad Pass, No. 62; Richardson Highw., Castner Glacier, Nos. 501 and 502. Kokrines Mts.: divide towards Melozitna R., Nos. 783 and 784. Yukon Delta: Kotlik, Nos. 880 and 881. Seward Pen.: Nome, *Thornton*, Nos. 41, 43 and 175 (T). Common in wooded parts of the interior; in the Bering Sea region rare in willow and alder thickets north to Seward Pen.

Dodecatheon frigidum Cham. & Schlecht. in Linnaea **1**: 222 (1826); Seemann, Bot. Herald Voy. 38, tab. 9 (1852).—Alaska Range: Broad Pass, moist, alpine meadows above timber line, No. 86; Richardson Highw., between Paxon and Summit, in a creek bed, No. 562; Paxon, above timber line, No. 584. Head of Chitina R.: *H. M. Laing*, No. 169. Kokrines Mts.: near sulphur springs, No. 680; divide towards Melozitna R., No. 785. Seward Pen.: Nome, *Thornton*, Nos. 61, 182 and 481 (T). Rare or occasional in moist, alpine meadows and snow-flushes of the interior; in the Bering Sea region in similar places at sea-level.

The Alaska plant has ovate-cordate, repand-dentate leaves; the upper part of the scape and the peduncles are minutely glandular-pubescent.

D. integrifolium Michx., Fl. Bor.-Am. **1**: 123 (1803).

Hultén, Fl. Aleut. 274, questions the record of this species in Ledebour, Fl. Ross. from "Kodiak and Unalaschka." In the National Herbarium of Canada is a sheet from Kodiak Isl., *J. M. Macoun*, No. 16.761.

Armeria vulgaris Willd. ssp. arctica (Wallr.) Hultén, Fl. Aleut. 275 (1937); for synonymy of the Alaska plant see Hultén l. c.—Seward Pen.: south coast, Bluff, on talus under a bird cliff, No. 1265; Port Clarence, wet meadows by the sea-shore, No. 1446; Nome, Anvil Hill, dry gravelly slope, No. 1389.

The first two numbers are the sea-shore plant with strongly ciliate leaves (typical ssp. *arctica*); in the last number the leaves are sparingly ciliate but the pubescence of the calyx is clearly that of the ssp. *arctica*. Both forms are fairly common in the Bering Sea region, north at least to Seward Pen.

Gentiana algida Pall. *G. frigida* Gray, not Haenke.—Seward Pen.: Nome, moist, grassy slopes of Anvil Hill, No. 1386; Nome, *Thornton*, Nos. 6 and 227 (T).

Our specimens mostly have a single pair of flowers, a few have single flowers, while some have an additional axillary flower. In our area apparently rare or occasional on moist alpine slopes of Seward Pen. and islands of the Bering Sea where it is a late-flowering species that perhaps does not mature seed except in favorable years. The

species is known also from a few places in high mountains of the interior of Alaska and Yukon Territory.

G. ALEUTICA Cham. & Schlecht. *G. unalaccensis* Bunge; ? *G. arctophila* var. β Griseb. in Hook. Fl. Bor.-Am. **2**: 61 (1840).—ALASKA RANGE: Nenana Valley, Healy, No. 367; Richardson Highw., between Summit and McCarty, No. 439; near Castner Glacier, No. 503-A.

The above numbers cannot satisfactorily be placed with *G. propinqua* nor with *G. arctophila* and are with some doubt referred to the above species, of which the writer has seen no authentic material. Our specimens differ from *G. propinqua* by their stout and somewhat undulate, yellowish-brown primary stem, by the large, 3-nerved and somewhat connate cauline leaves. The flowers are small, with a prominent calyx the lobes of which almost equal the tube of the corolla; the latter is pale blue, turning yellow when dry. The lobes are long-acuminate and without a crown.

The following numbers are intermediate between the above and *G. propinqua*, but because of their leafy stems, long calyx-lobes and pale bluish-yellow corollas are retained here. ALASKA RANGE: Richardson Highw., Castner Glacier, No. 503. KOKRINES MTS.: alluvial banks, No. 681. NORTON SD.: willow thickets, Pastolik, No. 1015. SEWARD PEN.: south coast, Bluff, dense, many-stemmed specimens from bird cliff, No. 1269.

G. ARCTOPHILA Griseb. in Hook. Fl. Bor.-Am. **2**: 61, tab. 149 (1840); Holm & Macoun in Rep. Can. Arct. Exp. **5**A: 19 (1921) in part, excl. tab. 11, fig. 1.—HEAD OF CHITINA R.: *H. M. Laing*, No. 175.

The above well matches Grisebach's description (l. c.) and his beautiful plate, as well as large series in the writer's collection from the arctic coast of Canada near the type locality.

G. GLAUCA Pall.—ALASKA RANGE: Broad Pass, No. 87; Richardson Highw., between Paxon and Summit, No. 560; Paxon, No. 585. KOKRINES MTS.: divide towards Melozitna R., No. 791. SEWARD PEN.: south coast, Nome, Anvil Hill, No. 1387; north coast, Buckland R., Clem Mt., No. 1616. Common in moist, alpine slopes, perhaps throughout the region, north to Wainwright Inlet (Seemann) and east through mountains of Yukon to the mouth of the Mackenzie.

One of the earliest flowering gentians of the region. No. 791 had flowers and almost mature fruit towards the end of June.

G. PROCERA Holm, in Ott. Naturalist, **15**: 179, tab. 12, figs. 3, 4 & 5 (1901).—ALASKA RANGE: Richardson Highw., between Summit and McCarty, in rich alluvial soil in open aspen woods, No. 440.

New to the flora of Alaska. The large series of specimens in the above collection well match the description of *G. procera* as well as the type (near Sarnia, Ont. September 9, 1892, *C. K. Dodge*, No. 11.793 Can), except that the calyx is perfectly glabrous. This character, however, appears to be rather variable in the section *Crossopetalum*, particularly in its western members. Our specimens appear to be biennial; the cauline leaves are narrow, the calyx-lobes unequal, the stigma broad, almost sessile, and the seeds dark brown, densely covered with short, rounded or obtuse papillae.

Our No. 440 well matches collections from Yukon Territory, Ranch Valley, *Gorman*, No. 1081 and Carmacks, *Eastwood*, No. 567 (both Can) as well as some collected in the Wood Buffalo Pk. of Northern Alberta, *H. M. Raup*, Nos. 3026–28, cited by him in Bull. Nat. Mus. Can. **74**: 157 (1935) and tentatively placed with *G. elegans*. That species, in addition to being strictly annual, has obtuse, broadly spathulate cauline leaves, equal calyx-lobes, the sinuses of which are obscurely fringed with hairs, and a style nearly as long as the capsule. Thus far *G. procera* has been known only from the Great Lake region and Stony Mt., Man.

G. PROPINQUA Richards.—HEAD OF CHITINA R.: *H. M. Laing*, Nos. 174, 176 and 234. NORTON SD.: sea-shore near Qiqertariaq, No. 1094. SEWARD PEN.: south shore, Bluff, No. 1270; Nome, Anvil Hill, Nos. 1384 & 1385.

The above numbers have simple or sub-simple slender stems and very short calyx; they well match specimens in the writer's collection from near the type locality in N. W. Mackenzie.

G. PROSTRATA Haenke.—ALASKA RANGE: Nenana Valley, Lignite, No. 312; Healy, No. 368; Richardson Highw., between Summit and McCarty, No. 441. HEAD OF CHITINA R.: elevation 5,500 ft., *H. M. Laing*, No. 235 (a form with bifid corolla-lobes). NORTON SD.: dry tundra ridges, Pastolik, No. 1016. SEWARD PEN.: south coast, Bluff, No. 1268; Nome, *Thornton*, No. 301 (T); Port Clarence, No. 1447. Occasional on moist, alpine slopes of central Alaska and the Yukon Territory; apparently common on dry ridges in lowland tundra of the Bering Sea region north to Kotzebue Sd.

G. TENELLA Rottb.—NORTON SD.: in brackish meadows bordering lagoon, Unalaklet, No. 1115. SEWARD PEN.: Port Clarence, No. 1448. Rare or occasional in brackish meadows of the Bering Sea region, north to Kotzebue Sd.

LOMATOGONIUM ROTATUM (L.) Fries. See Fernald in RHODORA, **21**: 193 (1919).—NORTON SD.: brackish margins of lagoon, Qiqertariaq, No. 1093. SEWARD PEN.: Nome, wet, brackish meadows by Snake R.,

No. 1388; Port Clarence, No. 1448-A. Apparently common in brackish meadows of the Bering Sea region, north to Kotzebue Sd.

Swertia perennis L. var. obtusa (Ledeb.) Griseb.—Alaska Range: in wet moss by a mountain brook, Paxon, south of the divide, collected in flower on June 29, No. 592.

Our material differs from the Eurasian *S. perennis* by the broadly obovate-oblong leaves and by the long and erect fringes around the nectar-glands. *Swertia* in Alaska belongs to the Pacific slope flora, and in the Alaska Range apparently does not cross the divide. Previously known only from the Pacific coast.

Menyanthes trifoliata L.—Alaska Range: Richardson Highw., margin of shallow lake, between Paxon and Summit, No. 561. Head of Chitina R.: elevation 2000 ft., *H. M. Laing*, No. 173. Kokrines Mts.: small lake in river valley, flowering and fruiting, June 23, No. 790. Norton Sd.: hills back of Unalaklet, margin of small lake, No. 1162. Seward Pen.: north coast, Buckland R., No. 1617. Common in marshy places, margins of shallow lakes etc., throughout the region; in mountains of the interior almost to the timber line.

In the Bering Sea region not previously recorded from north of the Aleuts.

According to Fernald in Rhodora, **31**: 195 ff. (1929), the plant of Eastern North America is var. *minor* Michx., which is said to differ in a few minor characters from that of the Pacific coast, Alaska and also of Eurasia. The writer is unable to detect any difference between his material of *Menyanthes* from Alaska and the Mackenzie district, except that in Alaska *Menyanthes* flowers and fruits much earlier than in the latter place. No. 790 from central Alaska had mature fruit the last part of June whereas on Great Bear Lake, climatically comparable with the Kokrines Mountains, *Menyanthes* flowers in July and apparently does not mature fruit except in favorable seasons.

Phlox sibirica L.—Norton Sd.: volcanic hills back of Pastolik, No. 926. Seward Pen.: south coast, Bluff, No. 1279; Nome, Anvil Hill, No. 1397. Common on gravelly mountain slopes of the Bering Sea region, north to Cape Lisburne.

Polemonium acutiflorum Willd.—Fairbanks: College, No. 242. Alaska Range: Mountains between Healy and Moody creeks, No. 272. Kokrines Mts.: divide towards Melozitna R., No. 793. Yukon Delta: Kotlik, Nos. 884 and 885. Seward Pen.: Nome, *Thornton*, No. 381 (T); Port Clarence, No. 1449. Diomede Isl.: Nos. 1720 and 1721. Common in moist, grassy places.

In the Bering Sea region *P. acutiflorum* flowers late in the season and in some years does not mature seed.

P. HUMILE Willd.—HEAD OF CHITINA R.: *H. M. Laing*, No. 117.

P. PULCHERRIMUM Hook.—SEWARD PEN.: north coast, Buckland R., No. 1620. The above, which with some doubt is referred to this species, is a perfect match for specimens from Bear Lake, N. W. T. (*A. E. & R. T. Porsild*, No. 3511).

Our plant is 30–40 cm. tall, with freely branching and very leafy stems from a creeping rhizome. The stem and calyx are viscid. The funnel-shaped flowers are almost as large as in *P. acutiflorum*, but the lobes of the corolla are not ciliate and the seeds are wingless. The flowers are much larger than in typical *P. pulcherrimum*.

LAPPULA REDOWSKII (Hornem.) Greene var. OCCIDENTALIS (Wats.) Rydb.—HEAD OF CHITINA R.: *H. M. Laing*, No. 182.

In Alaska previously known from Ft. Yukon (Rothr.).

ERITRICHIUM ARETIOIDES (Cham. & Schl.) DC.; Seemann, Bot. Herald Voy. 37, tab. 8 (1852).—SEWARD PEN.: south coast, Bluff, No. 1282; Nome, Anvil Hill, No. 1392; *Thornton*, Nos. 149 & 483 (T). Rare or occasional on gravelly mountain slopes of the Bering Sea region, north to Cape Lisburne.

Also known from mountains of northern Yukon Territory and the arctic coast west of Mackenzie (*D. D. Cairnes*, No. 83.066; *A. E. Porsild*, No. 7159). Our specimens well match Seemann's excellent plate.

MYOSOTIS ALPESTRIS Schm. var. ASIATICA Vestergr.—ALASKA RANGE: Richardson Highw., between Paxon and Summit, No. 564. HEAD OF CHITINA R.: *H. M. Laing*, No. 181. KOKRINES MTS.: divide towards Melozitna R., No. 794. SEWARD PEN.: south coast, Bluff, No. 1281; Nome, No. 1391. Fairly common in moist alpine meadows, north to Kotzebue Sd., and east through the mountains of Yukon to the arctic coast near the Mackenzie delta.

AMSINCKIA ? MENZIESII (Lehm.) Nels. & McBride.—SEWARD PEN.: Nome, *Thornton*, No. 131 (T). No doubt introduced.

MERTENSIA EASTWOODAE McBride in Contr. Gray Herb. (new ser.) **49**: 18 (1917). *M. Alaskana* Eastw. in Bot. Gaz. **33**: 287 (1902), non Britt.—KOKRINES MTS.: divide towards Melozitna R., in damp, cold spruce woods, flowering specimens on June 23, No. 792.

Our specimens well match the description as well as specimens from the type locality (Cape Nome, *Blaisdell* (NY)).

M. MARITIMA (L.) S. F. Gray.—NORTON SD.: St. Michaels, No. 1029; same place No. 1030 (f. ALBIFLORA Fern.); Qiqertariaq, No. 1095. SEWARD PEN.: Nome, *Thornton*, No. 411 (T). Common on sandy beaches along the Bering Sea shores.

M. PANICULATA (Ait.) G. Don.—FAIRBANKS: in a dry muskeg, with flowers and immature fruit on June 14, No. 204. ALASKA RANGE:

Broad Pass, flowering June 8, No. 88. HEAD OF CHITINA R.: dry burn, 2500 feet, *H. M. Laing*, No. 179; same place, 3500 feet, *idem*, Nos. 178 and 180 (the last a white-flowered form). LOWER YUKON: Anvik, *Mrs. Chapman*, No. 69 (NY). NORTON SD.: Unalaklet, *Palmer & Johnston*, No. 24 (NY). SEWARD PEN.: Nome, Anvil Hill, No. 1390; north coast, Kiwalik, No. 1482. A common and very early-flowering species throughout the region, in open spruce woods and willow thickets, north to Kotzebue Sd., east through the mountains of Yukon to the Mackenzie delta.

M. PANICULATA (Ait.) G. Don var. ALASKANA (Britt.) L. O. Williams in Ann. Mo. Bot. Gard. **24**, 1: 48 (1937). *M. Alaskana* Britt. in Bull. N. Y. Bot. Gard. **2**: 181 (1901).

In addition to the TYPE (Ft. Yukon, *A. Soule*, 1865 (NY)) the writer has seen a number of sheets all from mountains of the Yukon Territory and N. W. Mackenzie. The variety appears to be an endemic of this region.

SCUTELLARIA EPILOBIIFOLIA A. Ham. *S. galericulata* of Am. auth. not L.; see Fern. in RHODORA, **23**: 86 (1921).—FAIRBANKS: Smith Lake, No. 601. TANANA R.: Hot Springs, No. 648.

Apparently not previously known from north of the Pacific coast.

STACHYS PALUSTRIS L. var. HOMOTRICHA Fern. in RHODORA, **10**: 85 (1908).—TANANA R.: Hot Springs, No. 647.

Apparently new to the flora of Alaska.

MENTHA CANADENSIS L.—YUKON R.: Kokrines, No. 629. Common on riverbanks along the Yukon, at least to Holy Cross.

MIMULUS GUTTATUS DC.—TANANA R.: Hot Springs, No. 649. In wet moss by a brook.

Not previously known from north of the Pacific coast and the Aleuts.

PENSTEMON ? PROCERUS Dougl.—SEWARD PEN.: Nome, *Thornton*, No. 201 (T).

A low, herbaceous *Penstemon* with verticillate inflorescence of purplish-blue flowers.

VERONICA WORMSKJOLDII R. & S.; *V. alpina* var. *unalaschkensis* Cham. & Schlecht.—ALASKA RANGE: Richardson Highw., Castner Glacier, No. 505; between Paxon and Summit, No. 565; Paxon, No. 586. SEWARD PEN.: Nome, No. 1393. Rare or occasional on moist, grassy slopes of the Alaska Range; rare in the Bering Sea region north of the Yukon Delta.

V. AMERICANA Schweinitz.—TANANA R.: Hot Springs, No. 657. Near a recently abandoned settlement.

LAGOTIS STELLERI (Cham. & Schlecht.) Rupr.—NORTON SD.: volcanic hills back of Pastolik, dry gravelly ridges, No. 922. SEWARD

Pen.: south coast, Bluff, No. 1299; Nome, *Thornton*, Nos. 35 and 304 (T).

In No. 922 the style considerably exceeds the middle lobe of the corolla, the anthers are large and the filaments attached above the insertion of the middle lobe; the seeds are 7–8 mm. long.

Hultén, Fl. Kamtch. **4**: 104 (1930), illustrates the differences between the closely related *L. glauca* and *L. Stelleri*. According to him the distinguishing characters are chiefly found in the place of attachment of filaments and in the relative length of the filaments and style. From examination of living specimens it appears that in the plant of our area the flowers are proterandrous and that a considerable elongation takes place during anthesis, first of the filaments and later of the style. Also the length of the seed in the dozen samples examined shows variations from 4.5 to 8 mm. Our specimens match material from the Ural and the north coast of Siberia. When first expanded the corolla is bright sky-blue but soon fades. The flowers are without scent.

L. Stelleri is rare or occasional on moist alpine slopes of the Bering Sea region, north along the arctic coast of Alaska to the Mackenzie and in high mountains of the Yukon Territory.

Castilleja hyperborea Pennell in Proc. Acad. Nat. Sci. Phil. **86**: 532 (1934).—Head of Chitina R.: on dry slopes, 4500 feet elevation, *H. M. Laing*, No. 183. Seward Pen.: south coast, Bluff, on a dry mountain slope, No. 1277.

The type of *C. hyperborea* came from Sheenjek R., a tributary to the Porcupine, *J. B. Mertie* (US). To the notes on distribution given by Pennell, l. c., may be added that the species appears to be fairly common, in calcareous soil, on high mountains of Yukon and Alaska, north to Richardson Mts. west of the Mackenzie delta, south to Chitina R. near the 61st parallel, east to Campbell L. east of the Mackenzie Delta and west to Seward Peninsula.

Castilleja hyperborea seems abundantly distinct from all other northern members of the genus. The free part of the calyx is very prominent, with lobes almost equalling the corolla; the lobes are broad, somewhat spathulate, with a shallow notch at the tip forming two very short, obtuse, well rounded lobes. The anterior lip of the corolla is small, about three-fourths the length of the narrow galea. The bracts are large, lanceolate in outline, deeply lacerated, with from 5 to 7 narrow lobes, like the calyx and corolla yellow, drying

green, and towards maturity assuming a deep, bluish-black and most conspicuous tint (indigoticus).

C. PALLIDA (L.) Spreng.

After much time spent studying his rather copious material in *Castilleja*, from Alaska and arctic Canada, the writer, at length, decided entirely to follow Pennell's recent treatment of the Castillejas of northwestern North America. In the course of the study it became overwhelmingly clear to him that the genus, which even in the far north is complex, nevertheless, as shown by Pennell, is capable of hairfine division into small, but apparently distinct and constant species or subspecies. Whether or not the subdivision of *C. pallida*, as done by Pennell, is justified the writer cannot decide because of lack of material for comparison. Whereas the subspecies *caudata*, and possibly also ssp. *Mexiae*, seem abundantly distinct, perhaps even worthy of specific rank, the writer, with the complications arising from more abundant material, is somewhat in doubt about the distribution and segregation of ssp. *typica* and ssp. *elegans*. Thus the writer has seen no plants in Alaska that match typical ssp. *elegans* from arctic Canada. It seems abundantly clear, however, that only study of live material in the field can solve these problems.

C. PALLIDA (L.) Spreng. ssp. CAUDATA Pennell in Proc. Acad. Nat. Sci. Phil. **86**: 524 (1934). ? *C. occidentalis* Torr. in Ann. Lyc. N. Y. **2**: 230 (1828); *C. pallida* var. *occidentalis* Gray, Syn. Fl. **2**, 1: 297 (1886); Ostenf. Kria. Vidensk. Selsk. Skr. **8**: 64 (1909) sub *C. pallida* (L.) "HBK."—ALASKA RANGE: Richardson Highw., between Paxon and Summit, moist alpine slopes 2000–3000 ft., No. 566. KOKRINES MTS.: divide towards Melozitna R., moist alpine tundra, No. 799. NORTON SD.: volcanic hills back of Pastolik, No. 923.

The pale and late-flowering ssp. *caudata* superficially resembles *C. septentrionalis* of eastern North America, from which, however, it is amply distinct. It is an arctic-alpine plant of high mountains in Alaska and Yukon, reaching north to the Arctic Ocean, near the delta of the Mackenzie. Numerous entries in the writer's field notes emphasize that "the pale phase of *C. pallida*" always forms pure clumps without transitions to "the purple-flowered phase."

C. PALLIDA (L.) Spreng. ssp. ELEGANS (Ostenf.) Pennell in Proc. Acad. Nat. Sci. Phil. **86**: 526 (1934). *C. elegans* Ostenf. in Malte, in RHODORA, **36**: 187 (1934); *C. pallida* (L.) Spreng. var. *unalaschkensis* Ostenf. Kria. Vidensk. Selsk. Skr. **8**: 64 (1909), not Cham. & Schlecht. —KOKRINES MTS.: divide towards Melozitna R., alpine tundra, No. 800; ibidem, No. 801.

Both numbers differ considerably from authentic specimens of ssp. *elegans* from arctic Canada. In No. 800 the stem and leaves are glabrous, and the latter rather prominently 3-nerved, the upper with 2–3 pairs of long, narrow lobes. Inflorescence densely white-woolly; the bracts ample, laciniate; calyx-lobes deeply notched and the anterior lip of the corolla two-fifths the length of galea; corolla purple, drying black. In No. 801 the leaves are entire, and, like the stem, purplish and puberulent.

C. PALLIDA (L.) Spreng. ssp. MEXIAE (Eastw.) Pennell, Proc. Acad. Nat. Sci. Phil. **86**: 526 (1934).—ALASKA RANGE: Healy, west side of Nenana Valley, open woods and river flats, No. 369.

The above matches the description of ssp. *Mexiae*, the type of which came from Mt. McKinley Park, not far from Healy. Our specimen is that of a young plant which flowers for the first time.

C. PALLIDA (L.) Spreng. ssp. TYPICA Pennell, Proc. Acad. Nat. Sci. Phil. **86**: 522 (1934).—SEWARD PEN.: Nome, Anvil Hill, dry herb-mats, No. 1394.

Because of the deeply divided and narrow calyx-lobes, the nonsaccate anterior lip of the corolla half as long as the narrow galea, the above clearly belongs in *C. pallida*, and, following Pennell, is best placed with the ssp. *typica*.

EUPHRASIA MOLLIS (Ledeb.) Wettst.—NORTON SD.: Pastolik, No. 1019. Locally abundant, growing on the sides of large *Eriophorum vaginatum* tussocks.

The above, with some doubt, is referred to *E. mollis*. The leaves are smaller than in that species, but, like the simple stems, very hirsute. The corolla is yellow, the upper lip boat-shaped, barely notched.

E. DISJUNCTA Fern. & Wieg. in RHODORA, **17**: 190 (1915).—HEAD OF CHITINA R.: 2000 ft. elev., *H. M. Laing*, No. 237 SEWARD PEN.: south coast, Bluff, No. 1278.

Corolla yellow, upper lip not bilobed. See Hultén, Fl. Aleut. under *E. mollis*. No *Euphrasia* previously known from north of Pribilof Isl. and the Pacific coast.

RHINANTHUS GROENLANDICUS Chab.—SEWARD PEN.: south coast, Bluff, No. 1274.

Not previously reported from north of the Pacific coast and the Aleuts.

PEDICULARIS CAPITATA Adams.—ALASKA RANGE: Broad Pass, No. 92; mountains between Healy and Moody creeks, No. 271. HEAD

of Chitina R.: *H. M. Laing*, Nos. 185–187. Seward Pen.: Nome, *Thornton*, Nos. 64, 333 and 337 (T). Occasional on high mountains of the interior, apparently rare or local on mountains of Seward Pen.

P. flammea L.—Seward Pen.: north coast, Buckland R., No. 1625.

New to the flora of Alaska.

P. groenlandica Retz.—Alaska Range: Broad Pass, No. 90.

P. labradorica Wirsing. See Merrill in Rhodora, **40**: 292 (1938). *P. euphrasioides* Steph.—Fairbanks: Goldstream Cr. and Pedro Dome, No. 147; College, No. 239. Alaska Range: Broad Pass, No. 89. Head of Chitina R.: *H. M. Laing*, No. 184. Kokrines Mts.: divide towards Melozitna R., No. 796. Norton Sd.: hills back of Pastolik, No. 924. Seward Pen.: Nome, *Thornton*, No. 137 (T); north coast, Kiwalik R., No. 1483; Buckland R., No. 1623. Common in heaths and muskegs throughout the region, north at least to Kotzebue Sd.

P. lanata Cham. & Schlecht.—Alaska Range: Broad Pass, No. 91. Seward Pen.: north coast, Buckland R., No. 1624. Rare or occasional in wet tundra.

New to the flora of the interior of Alaska. Records of *P. hirsuta* from Alaska (Seem., Kjellm. and Eastw.) no doubt refer to *P. lanata*.

P. Langsdorffii Fisch. ex Stev. Monogr. Pedic. 49 (1822).—Alaska Range: Broad Pass, Nos. 90-A and 91-A; Nenana Valley, Healy, No. 370. Seward Pen.: Nome, *Thornton*, No. 339 (T).

New to the interior of Alaska, rare in the Bering Sea region north of the Pribilof Islands.

P. Oederi Vahl.—Seward Pen.: Nome, *Thornton*, Nos. 335 and 433 (T). Known also from Kotzebue Sd. and from the interior.

P. Pennellii Hultén, Fl. Aleut. 300, tab. 14 (1937). *P. palustris* sensu auctt. quoad pl. Al. non Sm.—Seward Pen.: south coast, Bluff, No. 1275; Nome, *Thornton*, No. 338 (T).

Previously known from Alaska Pen. and Norton Sd. (Hultén).

P. sudetica Willd.—Fairbanks: in a muskeg, No. 205; College, No. 238. Alaska Range: Nenana Valley, Lignite, No. 313; Richardson Highw., between Summit and McCarty, No. 444. Kokrines Mts.: divide towards Melozitna R., No. 798. Yukon Delta: Kotlik, No. 883. Seward Pen.: Nome, *Thornton*, No. 342 (T); north coast, Buckland R., Nos. 1622 and 1626. Common in wet tundra throughout the region.

P. verticillata L.—Alaska Range: Richardson Highw., Paxon, No. 587. Head of Chitina R.: *H. M. Laing*, No. 237. Kokrines Mts.: near sulphur springs, No. 682; divide towards Melozitna R., Nos. 795 and 797. Norton Sd.: hills back of Qiqertariaq, No. 1066. Seward Pen.: south coast, Bluff, No. 1276; Nome, Nos. 1395 and

1396. Rare or occasional throughout the region, north to Kotzebue Sd.; in the interior limited to high mountains.

Boschniakia rossica (Cham. & Schlecht.) B. Fedtsch.—Alaska Range: Nenana Valley, Healy, No. 371; Richardson Highw., between Summit and McCarty, No. 445. Head of Chitina R.: *H. M. Laing*, No. 180. Yukon R.: Birches, No. 612. Norton Sd.: hills back of Pastolik, No. 925; hills back of Unalaklet, No. 1163. Seward Pen.: Nome, *Thornton*, July 31, 1920 (T); north coast, Buckland R., No. 1627. Common in open forests, alder thickets and in luxuriant, not too wet muskegs, north to Kotzebue Sd.

Most often parasitic on the roots of *Alnus crispa* and *Picea glauca*, but occasionally found also on *Salix reticulata* and on *Chamaedaphne calyculata*. Also known from central Yukon and N. W. T. east to 110° W. and on the Mackenzie River north to the arctic coast.

Pinguicula villosa L.—Alaska Range: Broad Pass, flowering specimens on June 8th, No. 93; mountains between Healy and Moody creeks, No. 270. Kokrines Mts.: divide towards Melozitna R., No. 787. Seward Pen.: north coast, Buckland R., No. 1614.

A common species throughout the region, north at least to Kotzebue Sd.; in the interior perhaps chiefly in the mountains. *P. villosa* always grows in pure *Sphagnum sp.* in rather wet muskegs and tundra bogs; it flowers in June, soon after the snow disappears. The diminutive leaves are completely hidden in the *Sphagnum* and when past flowering the plant is extremely hard to see and, for this reason, it is, no doubt, often overlooked.

P. vulgaris L. *P. arctica* Eastw. in Bot. Gaz. **33**: 293 (1902).—Alaska Range: Nenana Valley, Healy, No. 366; Richardson Highw., between Summit and McCarty, No. 442. Seward Pen.: south coast, Bluff, No. 1271; Nome, *Thornton*, No. 18 (T). Rare or occasional in wet, springy places on calcareous soil throughout the region.

Utricularia intermedia Hayne.—Kokrines Mts.: divide towards Melozitna R., No. 787-A. Seward Pen.: Port Clarence, Can. Arct. Exp. No. 560; north coast, Buckland R., No. 1612.

The material shows well developed, but sterile specimens with large winter buds. Rare or occasional in shallow ponds and wet *Carex* bogs. New to the flora of Alaska.

U. vulgaris L. var. americana Gray. *U. macrorhiza* LeConte.—Fairbanks: Smith Lake, No. 600. Norton Sd.: Pastolik, No. 1009. Seward Pen.: north coast, Buckland R., No. 1613.

The first two numbers are in anthesis, the last is sterile but has large winter buds. Probably common in shallow lakes and ponds of the lowland throughout the region, north to Kotzebue Sd. The

Alaska plant belongs to the American race, var. *americana*, which apparently is distinct from the Eurasian plant by its consistently longer and more slender spur.

Plantago juncoides Lam. var. typica Fern. in Rhodora, **27**: 99 (1925).—Norton Sd.: Qiqertariaq, No. 1096. Common in brackish meadows of the Bering Sea shores, north to Kotzebue Sd.

Previously known from the Aleuts and the Pacific coast.

Plantago major L. var. asiatica (L.) Dcne.—Yukon R.: Kokrines, No. 628. Very common in alluvial soil along the Yukon, where it, no doubt, is indigenous.

Apparently new to the flora of Alaska.

Galium boreale L.—Fairbanks: College, No. 240. Alaska Range: Richardson Highw., between Summit and McCarty, No. 443. Tanana R.: Hot Springs, No. 651. Yukon R.: Birches, No. 611. Kokrines Mts.: divide towards Melozitna R., No. 789. Norton Sd.: Pastolik, No. 1018. Seward Pen.: south coast, Bluff, No. 1273; Nome, *Thornton*, Nos. 8 and 499-C (T); north coast, Kiwalik, Nos. 1480 and 1481; Buckland R., No. 1619. Very common in dry, lowland woods of the interior; rare or occasional on dry, grassy slopes of the Bering Sea region, north to Kotzebue Sd.

G. Brandegei Gray.—Fairbanks: wet places in muskeg, No. 210. Yukon Delta: Kotlik, brackish meadows, No. 882. Norton Sd.: low, wet tundra, Pastolik, No. 1017; Qiqertariaq, No. 1092; Unalaklet, wet meadows, No. 1116. Seward Pen.: Nome, brackish meadow near Snake R., No. 1398; north coast, Buckland R., No. 1618. A common species in wet, often brackish meadows, *Carex* and *Sphagnum* bogs of the lowland throughout the region, north to Kotzebue Sd.

In Nos. 882 and 1017 a faint kumarin scent was noticed in drying. *G. Brandegei* appears to be the most northern member of the genus, ranging north beyond the limit of trees, from Greenland to Bering Strait. Not previously recorded from Alaska.

G. tinctorium L. var. subbiflorum (Wieg.) Fernald in Rhodora, **39**: 320 (1937). See also Rhodora, **37**: 443 445 (1935).—Yukon R.: Holy Cross, in a wet cow pasture, No. 833.

In the above material the long, trailing stems are scabrous; the leaves are rough along the margins and the pedicels short and rather stout. New to the flora of Alaska.

G. trifidum L.—Fairbanks: Smith Lake, in wet *Carex* bog, No. 602. In our region a southern woodland species.

Previously known only from the Aleuts and the Pacific Coast.

G. triflorum Michx.—Alaska Range: Richardson Highw., Castner Glacier, locally abundant on fertile slopes and in willow

thickets, 2000 feet elevation, No. 504. Tanana R.: Hot Springs, in rich woods, No. 650. A southern woodland species.

Previously known only from the Aleuts and the Pacific coast.

Viburnum pauciflorum Raf.—Fairbanks: in willow thickets, No. 193. Head of Chitina R.: *H. M. Laing,* Nos. 191–193. Seward Pen.: Nome, *Thornton,* No. 122 (T).

New to the flora of central and N. W. Alaska.

Linnaea borealis L. var. americana (Forbes) Rehd.—Fairbanks: College, No. 237. Kokrines Mts.: divide towards Melozitna R., No. 788. Head of Chitina R.: *H. M. Laing,* Nos. 189–190. Seward Pen.: Nome, No. 1399. A common species of dry open woods throughout the region, in the Bering Sea region north to Kotzebue Sd., but becoming rare beyond the limit of trees.

Hultén, Fl. Aleutian Isl. p. 310, suggests that in Alaska the plant found west of 152° long. belongs to the Eurasian race. The writer doubts the correctness of this statement; at any rate, all *Linnaea* seen in the region visited by him belong to var. *americana.*

Adoxa Moschatellina L.—Alaska Range: Broad Pass, very rare, in wet, springy place by a brook, No. 60-A. Yukon R.: Anvik, Mission premises, June 15, 1907, *J. W. Chapman* (G).

Not previously recorded from Alaska.

Valeriana capitata Pall.—Fairbanks: in a *Picea* swamp, No. 206; College, No. 241. Alaska Range: Broad Pass, No. 94. Seward Pen.: Nome, No. 1400; north coast, Buckland R., No. 1621. Diomede Isl.: No. 1719. Common in wet, springy places throughout the region, north to the arctic coast.

Campanula lasiocarpa Cham.—Alaska Range: Nenana Valley, Lignite, No. 314; Healy, No. 372; Richardson Highw., Castner Glacier, No. 506. Kokrines Mts.: divide towards Melozitna R., No. 802. Norton Sd.: hills back of Pastolik, No. 927; hills back of Unalaklet, No. 1164. Seward Pen.: Nome, Anvil Hill, No. 1401; north coast, Buckland R., Clem Mt., No. 1628. Rare or occasional on gravelly mountain slopes throughout the region.

C. rotundifolia L.—Seward Pen.: Nome, *Thornton,* No. 332 (T).

Not seen by us; apparently absent from the interior and northern Alaska, Yukon Territory and N. W. Canada.

C. uniflora L.—Alaska Range: Nenana Valley, Healy, No. 373. Kokrines Mts.: divide towards Melozitna R., No. 803. Norton Sd.: hills back of Pastolik, No. 928; Pastolik, dry peaty tundra ridges, No. 1020; hills back of Unalaklet, No. 1165. Seward Pen.: south coast, Bluff, No. 1280; Nome, *Thornton,* No. 126 (T). Occasional on gravelly mountain slopes of the Bering Sea region. One or two stations in mountains of the interior.

Solidago lepida DC. var. elongata (Nutt.) Fern.—Tanana R.: Hot Springs, open woods and riverbanks, No. 654.

Our specimens are young. The stem is softly pubescent, the leaves are puberulent, long-acuminate, remotely, but sharply dentate. Not previously known north of the Pacific coast.

S. multiradiata Ait.—Alaska Range: Richardson Highw., sandy riverbank, Castner Glacier, No. 509; same place, on alpine slope, No. 510; Paxon, moist alpine slope, No. 588. Head of Chitina R.: dry hillsides, 2500 feet, flowering specimens, June 21, *H. M. Laing*, No. 196; fruiting specimens, July 14, *idem*, No. 195. Kokrines Mts.: divide towards Melozitna R., Nos. 811–812. A common species of dry mountain slopes of the interior.

S. multiradiata Ait. var. arctica (DC.) Fern.—Norton Sd.: Pastolik, in willow thickets, Nos. 1024 and 1024-A; hills back of Unalaklet, No. 1169. Seward Pen.: south coast, Bluff, No. 1295; Port Clarence, No. 1450.

In Alaska the var. *arctica* appears to be limited to the Bering Sea region and previous records of *S. multiradiata* or *S. Virgaurea* probably belong here.

Aster junceus Ait.—Fairbanks: Goldstream Cr. and Pedro Dome, No. 154.

The material is immature but most closely matches the above species.

A. sibiricus L.—Alaska Range: Richardson Highw., Castner Glacier, No. 511. Head of Chitina R.: *H. M. Laing*, No. 194. Yukon R.: Kokrines, riverbanks, No. 630. Kokrines Mts.: No. 683. Norton Sd.: Pastolik, No. 1022; hills back of Unalaklet, No. 1168. Seward Pen.: south coast, Bluff, No. 1289; Nome, *Thornton*, Nos. 66 and 196 (T); north coast, Kiwalik R., No. 1485. Common throughout the region in sandy places such as river banks and flats, dunes etc.

Erigeron acris L. var. asteroides (Andrz.) DC.—Alaska Range: Richardson Highw., Castner Glacier, No. 513. Kokrines Mts.: divide towards Melozitna R., No. 804. Common locally in mountains of the interior, on calcareous soil.

E. compositus Pursh.—Head of Chitina R.: between 3500 and 4500 feet elevation, *H. M. Laing*, Nos. 197 and 198.

E. elatus Greene, Pitt. **3**: 164 (1897). *E. acris* L. var. *arcuans* Fern. See Fernald in Rhodora, **40**: 347 (1938).—Fairbanks: sandy poplar ridge, No. 208. Alaska Range: Nenana Valley, Lignite, in poplar woods by a small stream, No. 316. Rare or occasional in the interior, on calcareous soil.

Apparently new to the flora of Alaska.

E. eriocephalus J. Vahl.—Head of Chitina R.: elevation 6,000 feet, *H. M. Laing*, No. 241.

New to the flora of Alaska.

E. glabellus Nutt. var. pubescens Hook.—Alaska Range: Richardson Highw., between Summit and McCarty, No. 448.

New to the flora of Alaska.

E. grandiflorus Hook., Fl. Bor.-Am. **2**: 18, tab. 123 (1840).—Norton Sd.: hills back of Pastolik, No. 933. Seward Pen.: south coast, Bluff, No. 1287.

E. radicatus Hook. Fl. Bor.-Am. **2**: 17, tab. 122 (1840). *E. nanus* Nutt.—Alaska Range: Broad Pass, on dry, gravelly slopes, No. 99.

New to the flora of Alaska.

E. unalaschkensis (DC.) Vierh.—Alaska Range: Richardson Highw., Castner Glacier, No. 512; Between Paxon and Summit, No. 567. Seward Pen.: south coast, Bluff, No. 1288; Nome, No. 1407.

The above series have larger heads than typical *E. unalaschkensis*.

Antennaria alaskana Malte in Rhodora, **36**: 107 (1934).—Fairbanks: Goldstream Cr. and Pedro Dome, dry gravelly slope, 2000 feet, No. 148. Norton Sd.: hills back of Pastolik, No. 936; volcanic hills at Qiqertariaq, No. 1067; hills back of Unalaklet, No. 1170. Seward Pen.: Nome, Anvil Hill, No. 1404; north coast, Buckland R., Clem Mt., No. 1631. Common on volcanic gravels in the mountains of the Bering Sea region, rare or occasional on high mountains of the interior.

Antennaria alaskana has a short, but well developed stout rootstock but no stolon-like offsets; the narrowly spathulate, crowded, densely adpressed-canescent leaves have purplish-colored petioles. The flowering stems are rather stiff and dark brown under the floccose tomentum. The heads are small and, as a rule more or less peduncled, sometimes four and five, but mostly three together. The pappus is rather short and the achenes glabrous. It seems a very well marked species, abundantly distinct from *A. monocephala* and *A. nitens*. The type came from Port Clarence, *Walpole*, No. 1496 (G).

A. anaphaloides Rydb. in Mem. N. Y. Bot. Gard. **1**: 409 (1900).—Fairbanks: clay banks and poplar ridges in a muskeg east of town, No. 207.

New to the flora of Alaska.

A. isolepis Greene in Ott. Nat. **25**: 41 (1911); Fernald, Rhodora, **26**: 102, tab. 142, fig. 7 (1924); Malte, Rhodora, **36**: 108 (1934).—Fairbanks: Goldstream Cr. and Pedro Dome, No. 149. Alaska Range: Broad Pass, No. 103; Richardson Highw., between Summit

and McCarty, fertile, shaly slopes, No. 449; Castner Glacier, sandy banks of stream, No. 507; between Summit and Paxon, gravelly slope, No. 569. Kokrines Mts.: divide towards Melozitna R., gravelly alpine slopes 3000 feet elev., No. 814. Common on dry mountain slopes of the interior.

The first two numbers are too young but most likely belong here. New to the flora of Alaska.

A. **Laingii**, n. sp. (Tab. 554, fig. 11–13). Planta dense humifusa, stolonibus prostratis longis; foliis basilaribus numerosis lineari-spatulatis acuminatis 1.0–1.5 cm. longis 0.3 cm. latis utrinque dense canescente-tomentosis; caule florifero paullum crasso et rigido, parte superiore lanato, inferiore canescente 8–14 cm. alto; foliis caulinis 10–14 lineari-spatulatis, planis, acuminatis vel mucronatis, nunquam scarioso-appendiculatis; capitulis femineis 3–8 plerumque dense glomerulatis; bracteis exterioribus viridibus apice fusco-scariosis dense albido-lanatis, interioribus lanceolato-obtusis chartaceis eburneis; pappo tenuiter barbellato, non plumoso; acheneis glabris; planta mascula ignota.

Caespitose, matted, with long, stolon-like offsets; leaves of the rosettes numerous, 1.0 to 1.5 cm. long, about 0.3 cm. wide, linear-spathulate, acuminate, densely canescent-tomentose on both sides; stems rather stout and rigid, woolly above, canescent below, 8 to 14 cm. high, leafy with 10 to 14 well developed, flat, linear-spathulate leaves, these canescent with a dense even felt, acuminate or mucronate, but not at all scarious-tipped; pistillate heads 3 to 8 in dense glomerules; outer bracts green, with scarious brown tips, like the peduncles densely white-woolly; inner bracts lanceolate, obtuse, papery, ivory white; pappus finely barbellate, not plumose; achenes glabrous; staminate plant unknown.—Head of Chitina R.: dry hillsides in small clumps, 2100 feet elevation, June 13, 1925, *H. M. Laing*, No. 210 (type); same place, sunny exposure, 2500 feet elevation, May 30, 1925, *idem*, No. 238. Alaska Range: Mt. McKinley Nat. Park, 63° 43′ N. 149° 15′ W., *E. Scamman*, No. 677 (G).

Antennaria Laingii is named for its collector, Mr. Hamilton M. Laing of Comox, British Columbia, who, by his collection of plants during the Mt. Logan Expedition to South East Alaska, made an important contribution from a botanically unknown region. By its dense matted growth, the very leafy stems and compact glomerulate ivory-white heads, it differs strikingly from all other boreal Antennarias. *A. Laingii* is perhaps most closely related to *A. arida* A. Nelson, described from southwestern Wyoming, but differs from this by its much stiffer and stouter stems and by the quite flat, not at all conduplicate or twisted, conspicuously mucronate leaves.

A. MONOCEPHALA DC., Prod. **6**: 269 (1837). *A. alpina* auctt. quoad pl. Alask. pro maxima parte; *A. exilis* Greene, Pitt. **3**: 288 (1898); Malte in RHODORA, **36**: 106 (1934); Hultén, Fl. Aleut. 319, tab. 15 above (1936).—HEAD OF CHITINA R.: 5500 ft. elevation, *H. M. Laing*, No. 239 (typical). SEWARD PEN.: Nome, Anvil Hill, No. 1405 (the specimens in the last number are not typical, perhaps *A. monocephala* × *philonipha*); Nome, *Thornton*, No. 52 (T).

A. **philonipha**, n. sp. (TAB. 554, FIG. 1–10). Planta dioica dense humifusa, stolonibus prostratis confertis 5–10 cm. longis, colonias parvas formans; foliis basilaribus spatulato-obovatis circa 1.5 cm. longis 0.4 cm. latis distincte mucronatis, supra glabratis, subtus adpresse sericeo-tomentosis aetate glabrescentibus; caulibus floriferis debilibus gracillimis praesertim supra, laxe floccoso-tomentosis, aetate glabrescentibus, femineis 10–14 cm. altis, masculis plerumque minus quam 10 cm. altis; foliis caulinis linearibus 5–10 valde reductis, apice appendicibus scariosis planis obtusis 2.0 mm. longis munitis; capitulis solitariis vel rarius 2–3, masculis parvis, juventute nutantibus, involucris circa 5.0 mm. altis, squamis obovatis plumbeis; pappo vix barbellato, apice paullo clavato; femineis majoribus involucris 6–7 mm. altis, squamis aequalibus tenuibus membranaceis acuminatis infra apicem umbrinis, juventute olivaceis, aetate pallide stramineis: pappo maturo rufidulo, scabro tantum, nullo modo plumoso; stylo exserto bifido; acheniis glabris.

Plant dioecious, matted, forming small colonies by stolon-like offsets 5 to 10 cm. long; basal leaves spathulate-obovate about 1.5 cm. long and 0.4 cm. wide, mucronate, glabrous above, appressed silky-tomentose beneath, becoming glabrate in age; stems very slender and weak, thinly floccose-tomentose, especially above, becoming glabrate in age, with 5 to 10 very reduced stem leaves tipped with a very conspicuous brown, flat, obtuse and scarious appendage 2.0 mm. long; stem of pistillate plant 10 to 14 cm. tall, that of the staminate as a rule less than 10 cm. high; heads solitary or very rarely 2 or 3 together, the staminate small, nodding when young, their involucres about 5.0 mm. high with obovate, lead-colored bracts; pappus scarcely barbellate, slightly thickened at the apex; pistillate heads somewhat larger, their involucres 6 to 7 mm. high, the bracts of equal length, thin and hyaline, acuminate, dark brown below the tips, olivaceous when young, becoming pale straw-colored in age; pappus rufidulous when mature, the rays merely scabrous, not at all plumose; style exserted, bilobed; achenes glabrous.—*A. philonipha* is an alpine species invariably found on snow-flushes, ranging from the Bering Sea region through mountains of Alaska and Yukon to the arctic coast east of Mackenzie. ALASKA RANGE: Richardson Highw., between Paxon and Summit, 2000 to 3000 ft. elev., No. 570; Paxon, south of divide, No. 590. MT. MCKINLEY NATIONAL PK.: 63° 43′ N., 149° 15′ W., *E. Scamman* (G). SEWARD PEN.: Nome, Anvil Hill, No. 1405-A. UNALASKA: mountain summits, August 22, 1891, *J. M. Macoun* (Can). YUKON TERRITORY:

ANTENNARIA PHILONIPHA, n. sp.: FIGS. 1–5, pistillate plants, and 6–8, staminate plants, × 2/5; FIG. 9, staminate head, × 5/3; FIG. 10, pistillate head, × 5/3; all from TYPE (Arctic coast, east of Mackenzie Delta, Northwest Territory, Canada).

ANTENNARIA LAINGII, n. sp.: FIGS 11 and 12, pistillate plants, × 2/5; FIG. 13, pistillate heads, × 5/3; all from TYPE (head of Chitina River, Alaska).

White Pass, *Eastwood*, No. 925 (Can) (the last two sub *A. monocephala*). NORTHWEST TERRITORY: Richardson Mts., west of Mackenzie delta, elevation 2000 ft., *A. E. Porsild*, Nos. 6861 and 6863; Caribou Hills, east of Mackenzie delta, *idem* No. 6553; Arctic Coast, east of Mackenzie, near Kittigazuit, in willow thickets, *A. E. & R. T. Porsild*, No. 2524 (TYPE).

Antennaria philonipha is nearest related to *A. monocephala* and where the two occur together intermediate forms or hybrids may be found. From the latter it may at once be distinguished by the thinner tomentum of the leaves, the elongated offsets, the tall and slender stems and by the larger pistillate heads. From *A. nitens* Greene, a very doubtful species described from Hudson Bay, it is distinguished by the elongated offsets and the tomentose stem.

A. SUBCANESCENS Ostf. in Malte in RHODORA, **36**: 112 (1934). *A. alpina* sensu Macoun & Holm in Rep. Can. Arct. Exp. **5**: 21A, tab. 12, fig. 3 (1921), non Gaertn.—ALASKA RANGE: Broad Pass, No. 102; mountains between Healy and Moody creeks, 4000 feet, No. 273.

Very closely related to *A. compacta* Malte, from which it is distinguished by narrowly obovate mucronate thinly tomentose leaves and the glabrate dark green stems and more acuminate involucral bracts. Like that species it has a short thick rhizome. The pappus is short, somewhat sordid and the achenes glabrous. New to the flora of Alaska.

ACHILLEA BOREALIS Bong.—ALASKA RANGE: Richardson Highw., between Summit and McCarty, common on dry, shaly banks, No. 447. HEAD OF CHITINA R.: shaly slope, 4500 feet elevation, *H. M. Laing*, No. 240.

The specimens in the first number are 40 to 60 cm. high, with a much branched inflorescence with peduncles 4 to 10 cm. long, and very firm and compact glomerules. The margins of the involucral bracts vary from pale to dark brown. The specimens are a perfect match for some from Vancouver Island, B. C., labelled by Rydberg *A. fusca* Rydb. (Can).

Achillea borealis appears to be a southern, late-flowering species, in our region confined to the interior and to the Pacific coast; previously known from the latter area and from the Aleuts, north to Nunivak Isl., *J. M. Macoun*, No. 20.626 (Can).

A. MILLEFOLIUM L. var. NIGRESCENS E. Mey. *A. subalpina* Greene, Leaflets, **1**: 145 (1905).—HEAD OF CHITINA R.: elevation 2000 feet, *H. M. Laing*, No. 199.

A. SIBIRICA Ledeb. *A. multiflora* Hook. See Fern. in RHODORA,

31: 219 (1929).—Tanana R.: Hot Springs, No. 653. Common on alluvial banks of the Yukon and Tanana rivers, also in central Yukon, east to the Mackenzie delta (Porsild ined.).

Matricaria ambigua (Ledeb.) Kryl. Fl. Alt. **3**: 625 (1904). *Chrysanthemum grandiflorum* Hook. not Boiss. For discussion and complete synonymy see M. P. Porsild in Medd. om Grønl. **92**, 1: 72 (1932).—Seward Pen.: Nome, *Thornton*, No. 68 (T). Occasional on sea-shores of the Bering Sea region and the arctic coast.

Chrysanthemum integrifolium Richards.—Seward Pen.: south coast, Bluff, No. 1292; Nome, *Thornton*, Nos. 153, 188 and 316 (T). Occasional or rare on the Bering Sea shores and the arctic coast.

C. arcticum L.—Yukon Delta: Kotlik, No. 886. Norton Sd.: Unalaklet, No. 1119; Qiqertariaq, No. 1097. Seward Pen.: Nome, *Thornton*, Nos. 55, 202 and 394 (T). Diomede Isl.: No. 1726. Common in wet, brackish meadows along the Bering Sea shores, north along the arctic coast.

Tanacetum bipinnatum (L.) Schultz-Bip.—Yukon R.: Birches, river banks, No. 613. Yukon Valley: *L. M. Turner* (G); Ramparts, *J. A. Kusche*, 1916 (G). Kobuk R.: *L. J. Palmer*, No. 633. Lower Kuskokwim R., *Hinckley*, Aug. 1898 (G). Common throughout the interior of Alaska on sandy river banks.

Artemisia arctica Lessing in Linnaea **4**: 213 (1831). *A. norvegica* auth. not Fr.—Fairbanks: Goldstream Cr. and Pedro Dome, 2000 feet elev., No. 152. Kokrines Mts.: divide towards Melozitna R., No. 806. Seward Pen.: south coast, Bluff, No. 1283; Nome, *Thornton*, No. 15 (T); north coast, Buckland R., No. 1632. Diomede Isl.: No. 1723. Perhaps the most common member of the genus in arctic N. W. Alaska and on high mountains of the interior.

It most often grows on moist slopes and snow flushes. Towards maturity, the heads become sharply deflexed.

A. borealis Pall.—Diomede Isl.: No. 1722.

Apparently a rare species in Alaska; reported from Seward Pen. and Kotzebue Sd. (Kjellm., Seem.) but not seen by us.

A. globularia Cham. in Bess. Nouv. Mém. Soc. Nat. Mosc. **3**: 64 (1834).—Kokrines Mts.: divide towards Melozitna R., elev. 3000 feet, No. 815.

New to the interior of Alaska, but previously known from the Bering Sea region north to Cape Lisburne (Hultén).

A. hyperborea Rydb. in N. Am. Fl. **34**, 3: 262 (1916). *A. arctica* Bess. in Hook. Fl. Bor.-Am. **1**: 323 (1840), in part, not *A. arctica* Less.—Alaska Range: Nenana Valley, Healy, No. 374.

The above well matches material from arctic Canada.

A. senjavinensis Bess. in Nouv. Mém. Soc. Nat. Mosc. **3**: 65 (1834). *A. androsacea* Seem. Bot. Voy. Herald, 34 tab. 6. (1852).—

Seward Pen.: Nome, Anvil Hill, alpine slopes, No. 1406; *Thornton*, No. 152 (T). This rare plant is well illustrated by Seemann l. c.

A. spithamaea Pursh.—Yukon R.: just above delta, No. 840. Common along the Yukon R., in alluvial soil.

A. Tilesii Ledeb.—Alaska Range: Richardson Highw., Castner Glacier, on grassy slopes, No. 508. Seward Pen.: Nome, *Thornton*, Nos. 191 and 498 (T); north coast, Kiwalik R., No. 1484; Buckland R., No. 1633 (the last two are var. elatior T. & G). Diomede Isl.: Nos. 1724 and 1725.

Very common in the Bering Sea region where it is one of the first perennials to pioneer on fresh soil, such as slumping river banks, mining dumps and cultivated land; and for this reason it is very abundant about human habitations, where, on manured soil, it grows 1.5 m. tall.

A. ? Tyrrellii Rydb. in N. Am. Fl. **34**, 3: 262 (1916).—Kokrines Mts.: divide towards Melozitna R., No. 805. Seward Pen.: south coast, Bluff, Nos. 1284–1286.

The above well matches Rydberg's description as well as the rather fragmentary specimen on which it is based: Northern B. C.: Selkirk Trail, Sept. 6, 1898, *J. B. Tyrrell*, No. 19.439 (Can). Our specimens all have fertile disc-flowers and long-peduncled, more or less globose heads, with brown-margined canescent-tomentose bracts. *A. Tyrrellii*, no doubt, is closely related to *A. hyperborea* from which it is easily distinguished by the dense, white, appressed tomentum, much thicker than in *A. hyperborea*, and by the lax, long-peduncled inflorescence.

Petasites frigidus (L.) Fries. *P. gracilis* Britt. in Bull. N. Y. Bot. Gard. **2**: 186 (1901).—Alaska Range: Broad Pass, in a wet muskeg, No. 101. Head of Chitina R.: wet places, elevation between 2500 and 3000 feet, *H. M. Laing*, Nos. 200 to 202. Yukon Delta: Kotlik, No. 887. Seward Pen.: Nome, *Thornton*, Nos. 71 and 491 (T). Diomede Isl.: No. 1729.

Apparently a western arctic-alpine species, common in the Bering Sea region, north along the arctic coast to Coronation Gulf and Melville Island; also in high mountains of the interior of Alaska and Yukon, south to mountains of Alberta and British Columbia.

Arnica attenuata Greene.[1]—Head of Chitina R.: elevation 3000 feet, *H. M. Laing*, Nos. 204 and 205. Although not previously reported from Alaska, *A. attenuata* will probably prove common, at least in the northern parts.

[1] The Arnicas in the collection were kindly named by Professor M. L. Fernald.

Of the several species that have lately been segregated from *A. "alpina,"* *A. attenuata*, perhaps, in its range is the most arctic and most widely distributed and also the earliest flowering. Its present known range is from W. Greenland, between the 69th and 70th parallel, across arctic Canada, north of the limit of trees to mountains of Yukon and S. E. Alaska.

A. Lessingii Greene, Pitt. **6**: 167 (1900). *A. obtusifolia* auth. not Less. See Hultén, Fl. Aleut. 330 (1937).—Head of Chitina R.: *H. M. Laing*, No. 203-A. Norton Sd.: hills back of Pastolik, No. 932. Seward Pen.: south coast, Bluff, No. 1291; Nome, No. 1402.

In the above series the heads are nodding at all stages; the ligules are very pale yellow and the fruiting heads almost globular. The achenes are quite glabrous and the pappus brownish. The basal leaves are glabrous, 3-nerved, ciliate, and the stem often scapose.

A. Louiseana Farr in Ott. Nat. **20**: 109 (1906). ? *A. brevifolia* Rydb. in N. Am. Fl. **34**: 329 (1927).—Fairbanks: Goldstream Cr. and Pedro Dome, No. 150; College, No. 243. Alaska Range: Broad Pass, Nos. 95 and 96. Kokrines Mts.: divide towards Melozitna R., No. 807. Norton Sd.: hills back of Pastolik, Nos. 930 and 932-A; dry tundra at Pastolik, No. 1021; hills back of Unalaklet, No. 1166. Seward Pen.: south coast, Bluff, No. 1290; north coast, Buckland R., No. 1629.

This pretty, large-flowered *Arnica*, not previously recorded from north of the type locality in the mountains of Jasper Park, Alberta, appears to be common throughout the region visited by us. In the interior it grows in open, dry spruce and birch woods, from the lowland to altitudes above 2000 feet; in the Bering Sea region it grows in herb-mats and willow thickets, north to Kotzebue Sd. and thence east to the Mackenzie. Fernald records and illustrates it from the Gaspé Peninsula and from western Newfoundland (See Rhodora, **35**: 368 and pl. 270 (1933)).

A. tomentosa J. M. Macoun in Ottawa Naturalist, **13**: 166 (1899). *A. pulchella* Fern.—See Rhodora, **35**: 364 (1933).—Head of Chitina R.: *H. M. Laing*, No. 203.

Previously known only from mountains of Alberta and British Columbia and also from Newfoundland.

Senecio atropurpureus (Ledeb.) Fedtsch. in Fedtsch. & Fler. Fl. Eur. Russ. 992 (1910). *Cineraria atropurpurea* Ledeb. in Mém. Acad. St. Petersb. **5**: 574 (1814); *Senecio integrifolius* Kjellm., Vega Exp. Vetensk. Iakttag. **3**: 29 (1883), not *S. integrifolius* (L.) Clairv.; *S. integrifolius* var. *Lindstroemii* Ostf., Kri. Vidensk. Selsk. Skr. **8**: 70,

tab. 3, fig. 20 (1910).—Kokrines Mts.: divide towards Melozitna R., No. 809.

The above differs from the plant common in the mountains of Yukon and the arctic coast east to Mackenzie by being more lanulose and by the more compact inflorescence. Also the cauline leaves are very narrow, the basal ones repand-dentate. Rare or occasional in thickets and herb-mats of the Bering Sea region, north to Seward Pen. (Kjellm.) and Kotzebue Sd.

S. conterminus Greenm.—Alaska Range: Nenana Valley, Healy, No. 375; same place, *J. P. Anderson*, No. 1970 (as *S. resedifolius*) (NY); Richardson Highw., Rapids Lodge, *E. Scamman*, No. 1031 (G). Head of Chitina R.: elevation 4800 feet, *H. M. Laing*, Nos. 207 and 208. Yukon R.: Ft. Yukon, *J. P. Anderson*, No. 1954 (as *S. resedifolius*) (NY); just above delta, No. 841.

New to the flora of Alaska.

S. frigidus (Richards.) Less.—Alaska Range: Broad Pass, Nos. 97 and 98; Richardson Highw., Paxon, No. 568. Kokrines Mts.: divide towards Melozitna R., No. 810. Seward Pen.: Nome, *Blaisdell* (NY). Diomede Isl.: No. 1728. Common in not too wet tundra of the Bering Sea region; in the interior apparently limited to the alpine zone.

S. **Kjellmanii**, n. nov. *Cineraria frigida* Richards. f. *tomentosa* Kjellm., Vega Exp. Vetensk. Iakttag. **2**: 13, tab. 1 (1883) non *Senecio tomentosus* Michx., Fl. Bor.-Am. **2**: 119 (1803).—Head of Chitina R.: elevation 5000 feet, June 26, 1925, *H. M. Laing*, No. 206; same place, elevation 5500 feet, July 25, 1925, *idem*, No. 243. Steese Highw., Eagle Summit, 109 mi. north of Fairbanks, 3800 feet, *E. Scamman*, Nos. 854–855 (G); also from high mountains west of the Mackenzie Delta (*A. E. Porsild* ined.).

The above specimens match Kjellman's detailed description and beautiful plate and also specimens from the type locality, St. Lawrence Isl.: August 15, 1891, *J. M. Macoun*, No. 71 (NY); same place, *idem*, No. 20.642 (Can) (both sub *S. frigidus*). *Senecio Kjellmanii* is perhaps nearest related to *S. frigidus*, from which it is abundantly distinct by its firm and stout rootstock, floccose-lanate and leafy stem and large heads. Not previously recorded from the mainland of Alaska.

S. lugens Richards.—Alaska Range: Nenana Valley, Lignite, No. 315; Richardson Highw., between Summit and McCarty, No. 452; Paxon, No. 589. Head of Chitina R.: *H. M. Laing*, No. 209. Kokrines Mts.: No. 684. Norton Sd.: Pastolik, No. 1025. Seward Pen.: Nome, *Thornton*, Nos. 28 and 351 (T); north coast, Kiwalik R.,

No. 1451. Common in willow thickets and in moist, grassy places of the Bering Sea region; also on high mountains of the interior.

S. PALUSTRIS (L.) Hook.—NORTON SD.: Pastolik, No. 1026. SEWARD PEN.: Nome, *Thornton*, Nos. 56 and 58 (T); north coast, Buckland R., No. 1634. Very common in the Bering Sea region in wet places. See notes under *Rorippa barbareaefolia.*

The var. *congestus* (R. Br.) Hook. is merely a depauperate edaphic form of no taxonomic importance. It may be found in any large stand of the typical plant.

S. PSEUDO-ARNICA Less.—NORTON SD.: sea-shore at Unalaklet, No. 1120. SEWARD PEN.: Nome, *Thornton*, No. 432 (T). Common on sea-shores of the Bering Sea region north to Kotzebue Sd.

In life the whole plant exhales an objectionable, fetid odor.

S. RESEDIFOLIUS Less. in Linnaea **6**: 243 (1831); Greenman, Mon. Senecio **1**, 1: 24 (1901).—NORTON SD.: hills back of Pastolik, No. 929; dry tundra ridges, Pastolik, No. 1023; hills back of Unalaklet, No. 1167. SEWARD PEN.: south coast, Bluff, No. 1294; Nome, Anvil Hill, No. 1403. Common on gravelly mountain slopes of the Bering Sea region.

All the above, with the exception of No. 1294, belong to the var. *columbianus* Gray, but, as pointed out by Fernald in RHODORA, **26**: 113 ff. (1924), in the northern Senecios, at least, the presence or absence of discoid heads is of little taxonomic value. The writer has found plants having discoid heads wherever the species occurs.

S. VULGARIS L.—TANANA R.: Hot Springs, near a recently abandoned settlement, No. 652 (no doubt introduced).

SAUSSUREA ANGUSTIFOLIA DC.—ALASKA RANGE: Richardson Highw., between Summit and McCarty, Nos. 446 and 446-A. KOKRINES MTS.: divide towards Melozitna R., No. 813. NORTON SD.: hills back of Pastolik, Nos. 934 and 935; SEWARD PEN.: south coast, Bluff, No. 1296; north coast, Kiwalik R., No. 1486; Buckland R., No. 1630. Common in dry tundra of the Bering Sea region north to the arctic coast and in high mountains of the interior. The material, like a still larger series from Arctic Canada, is very variable.

S. SUBSINUATA Ledeb.—NORTON SD.: hills back of Qiqertariaq, No. 1098.

The above large-headed and large-leaved plant is referred to *S. subsinuata*, because of the long-attenuate outer involucral bracts, the longest of which are tipped with yellow hairs. Our No. 1098 does not look like Seemann's plate, l. c. tab. 7. The leaves are wide and coarsely sinuate but such leaves are not uncommon in the very polymorphous *S. angustifolia.*

Taraxacum alaskanum Rydb.[1]—Head of Chitina R.: *H. M. Laing*, no. 244.

T. lacerum Greene.—Head of Chitina R.: on a dry slope, 4800 ft. alt., *H. M. Laing*, no. 212.

T. lateritium Dahlst.[1]—Diomede Isl.: rare on moist slopes, No. 1730. Common on Bering Sea shores.

T. mutilum Greene.—Alaska Range: Broad Pass, in wet clay in valley-bottom, No. 100; Richardson Highway, between Summit and McCarty, dry shale of slopes, No. 451. Norton Sd.: Unalaklet, seashore and dunes, No. 1118. Seward Pen.: south coast, Bluff, dry tundra, Nos. 1297 and 1298.

Crepis nana Richards. *Youngia pygmaea* Ledeb., Fl. Ross. **2**: 838; *Y. nana* (Richards.) Rydb. Rocky Mt. Fl. 1021 (1917).—Alaska Range: Richardson Highw., on gravel bars in glacial stream, Castner Glacier, No. 514. Head of Chitina R.: *H. M. Laing*, No. 214. Seward Pen.: Port Clarence, *Kjellman* (C).

Rydberg, l. c., describes this plant as being a "depressed perennial with creeping rootstock." The writer has never seen the slightest indication of a creeping rootstock in *Crepis nana;* on the contrary it has a very pronounced tap-root which is often branched into a number of caudices, where the plant, as it generally does, grows in sand subject to drifting. Kjellm. Vega Exp. **2**: 31–32 (1883) says, in part: "Planta nostra caespites densos, plane disciformes, solo adpressos format. Radix valida, verticaliter descendens." This is well illustrated by Macoun & Holm, Rep. Can. Arctic Exp. **5**: tab. 12, fig. 3 (1921),

Hooker, Fl. Bor.-Am. **1**: 297, remarks "acheniis in rostrum attenuatis." This character is barely noticeable and in the majority of achenes examined there is no constriction below the disc. The achene is smooth, finely many-ribbed, while in *C. elegans* it is few-ribbed and retrorse on the sides of the ribs.

Cr. elegans Hook. Fl. Bor.-Am. **1**: 297 (1840). *Youngia elegans* (Hook.) Rydb. Rocky Mt. Fl. 1021 (1917).—Fairbanks: Goldstream Cr. and Pedro Dome, in sandy places, No. 153. Head of Chitina R.: *H. M. Laing*, No. 215.

New to the flora of Alaska.

[1] The material of *Taraxacum* was determined by the late Dr. H. Dahlstedt, but the collection with his notes was subsequently loaned to Dr. Haglund, Lund. The above determinations, excepting that of *T. alaskanum*, were kindly supplied by Dr. Haglund.

A REVIEW OF THE GENUS GITHOPSIS[1]

Joseph Ewan

(Plate 555)[2]

Githopsis, an endemic genus of annual campanulaceous herbs of Pacific North America, illustrates a method in the mechanics of the origin of species, namely, the fragmentation through recent geologic time of a once wide-ranging species, which may be taken as the ancestral prototype and which occupied much of the present range of the genus, into geographically discontinuous units now recognizable as species. These derivative species, then, have ultimately occupied contiguous but physiographically discrete regions.

In the field *Githopsis* species are subordinate elements in the biota, appearing in the spring months as delicate annuals growing beneath shrubs or subshrubs. They complete their life cycles in about two months and are easily overlooked in the field. It is not surprising that no synoptical study of the genus has been made during the near century that it has been known to botanists.

Githopsis as a genus was published by Nuttall in the year 1843.[3] He described at that time *Githopsis specularioides* which, accordingly, becomes the indubitable type-species of the genus. The generic name *Githopsis* was suggested to Nuttall by the long leafy calyx-lobes which recall those of the European Corn Cockle, *Agrostemma Githago*.[4] The affinity of the newly proposed genus to the campanulaceous genus *Specularia* was pointed out by Nuttall and is reflected in his choice of specific name "specularioides."

This study has been importantly advanced by generous assistance from Sir A. W. Hill, Kew, who loaned critical material, and by Mr. George Taylor, British Museum of Natural History, South Kensington, who furnished notes upon the type of *Githopsis specularioides* against selected collections sent him for comparison. In this country it is a pleasure to extend my thanks especially to Dr. W. L. Jepson who kindly made notes and comparisons for me at Kew in 1935 and

[1] Presented in abridged form at November, 1937, meeting of the Colorado-Wyoming Academy of Sciences, at Boulder, Colo.

[2] Cost of the plate defrayed by the University of Colorado.

[3] Trans. Amer. Philos. Soc. n. s. 8: 258. 1843.

[4] Corn Cockle, which in turn seems to have received its name from another plant, is characterized by Darlington (Fl. Cestrica ed. 3, 31. 1853) thus: "This foreign weed (specifically named *Githago*, from its fancied resemblance to "Gith," or Guinea-Pepper), though diligently rooted out by all neat farmers, obstinately maintains its ground in our grain fields."

Isotype of Githopsis pulchella

who made available the photograph accompanying this paper. I am grateful to Dr. W. R. Maxon, Dr. F. W. Pennell and to Mr. C. A. Weatherby for important notes and to the curators of the following herbaria for courtesies relative to my study of their collections: California Academy of Sciences, Stanford University, University of California, Pomona College, Jepson Herbarium at Berkeley, the herbaria of Dr. Robert F. Hoover, Berkeley, and of Mr. F. W. Peirson of Altadena, California, United States National Herbarium and the Rocky Mountain Herbarium.

Githopsis Nutt.—Inconspicuous annuals, usually of low often simple habit, the stems commonly angled, sometimes freely branched from near the base and then of tufted globular habit; herbage glabrous or commonly hispid-pubescent with stiff short hairs; leaves inconspicuous, scattered, the internodes evident, the leaf-blades cuneate-obovate, narrowed to the sessile base, entire or nearly so or evidently toothed at the summit and also with a few lateral teeth; flowers axillary, borne in the upper stem-axils or only terminal or both; calyx-tube medianly distended, lineate to ribbed or even deeply grooved, the lobes usually conspicuous, often equalling the tube, leaf-like (indeed often toothed in the manner of the leaves), linear-acicular or subulate to narrowly lanceolate, firm, erect to widely spreading and sickle-curving at post-anthesis; corolla minute, little if at all exserted, to larger and showy, then Linanthus-like, salverform to campanulate, one-half to one and one-half times as long as the calyx-lobes; seeds ovoid to elliptical or subtriquetrous, 0.5–1.0 mm. long, smooth, shining and concolorous.

Type species, *Githopsis specularioides* Nutt.

Key to the Species

Stems stout to slender but never elongated-filiform, the branches many to few; flowers evident (more than 4 mm. long); calyx-tube 4–12 mm. long.
Middle cauline leaves oblong-ovate, conspicuous, recalling those of *Euphorbia Peplus;* corolla-lobes obtuse at the apex. 1. *G. latifolia.*
Middle cauline leaves linear or short-oblong, reduced, mostly inconspicuous; corolla-lobes rounded or acute at apex.
Corolla 15–20 mm. long (i. e. half again as long as the calyx-lobes), showy; plants slender, glabrate above, openly and sparingly branched ..... 2. *G. pulchella.*
Corolla 4–10 (or 15) mm. long, inconspicuous (somewhat showy in large-flowered race of *G. calycina*); plants mostly stout (slender in *G. diffusa*), setulose to glabrate, freely, often abundantly branched.
Corolla 5–10 mm. long; fruiting calyx distended medianly, more or less strongly ribbed.
Corolla one-half to about equalling the calyx-lobes at anthesis, bright blue; calyx-lobes at post-anthesis erect or turbinate-spreading, linear-subulate, never outwardly sickle-curving ..... 3. *G. specularioides.*

Corolla equalling (or in a large-flowered race conspicuously exceeding) the calyx-lobes at anthesis, dark blue; calyx-lobes at post-anthesis strongly accrescent, foliaceous, lance-subulate, widely or even arcuately flaring ..... 4. *G. calycina.*

Corolla 3–5 mm. long; fruiting calyx linear, a little enlarged at the summit, 5-nerved, not at all ribbed.

Fruiting calyx 8–11 mm. long; herbage usually wholly glabrous; stems openly and sparingly branched, the plants thus tall (10–30 cm. high) and slender ..... 5. *G. diffusa.*

Fruiting calyx 4–7 mm. long; herbage distinctly setulose; stems shortly and repeatedly branched, the plants thus as broad as high (5–12 cm. high), tufted and leafy ..... 6. *G. gilioides.*

Stems elongated-filiform, the branches few, widely spreading, almost twining; flowers minute (3–6 mm. long); calyx-tube 3–5 mm. long ..... 7. *G. filicaulis.*

Treatment of the Species

1. Githopsis latifolia Eastw. Proc. Calif. Acad. Sci. ser. 4, **20**: 154. 1931, based on a coll. of (Mrs.) *A. L. Coombs*, IX 1912, made at Big Meadows, Plumas Co., Calif. Type (Calif. Acad. Sci. Herb. 171875) examined. Only upper portion of plant extant.—Stems slender, elongated, somewhat straggling, giving a loose habit; herbage almost wholly glabrous, with some few hairs along the stem-angles; middle cauline leaves oblong-obovate, sessile, scattered, entire, 12–20 mm. long, the basal leaves unknown; flowers wholly terminal; calyx-lobes about equalling or slightly exceeding the corolla, narrowly lanceolate, thin, widely spreading; corolla open-campanulate, light purple, "1 cm. across," the lobes distinctly obtuse at the apex (very broad for the genus); young capsule lightly ribbed, the bases of the calyx-lobes scabrous; seed unknown.

With the type specimen but a slender starveling of a plant, *Githopsis latifolia* is the least known member of the genus. Of this species I have seen only the type collection. Its anomalous characters of leaf and corolla lead one to doubt the propriety of maintaining it here. Yet, coming as it does from the least known area of the Sierra Nevada of California where little botanizing has been carried on since the days of the resident collectors, Mrs. Mary E. Pulsifer Ames, Mrs. Rebecca Merritt Austin[1] and John Gill Lemmon,[2] it seems worth while

[1] Mrs. R. M. Austin (1832–1919), as an active collector of the native flora between the years 1866 and 1900, botanized particularly in Modoc, Butte and Plumas counties. In addition to sending her collections to E. L. Greene, especially while he was Professor of Botany at the University of California (1885–1895), Mrs. Austin made considerable distributions of her collections. Accordingly her collections are to be found in the Brandegee Herb. at Berkeley, in the Jones Herb. at Pomona Coll. and in the U. S. Nat. Herb. Her biography has been done by Jepson, Madroño **2**: 130–133, 157. 1934.

[2] John Gill Lemmon (1832–1908) was first a resident of Sierra Valley, Plumas County, upon his coming to California. He botanized at several localities about the

to point out its characters rather prominently that we may search for the plant over that area toward the day when we may better evaluate its validity as a species.

2. G. PULCHELLA Vatke, Linnaea **38**: 714. 1874, based on *Bridges 153* from "California," the exact locality unknown. Bridges' notebooks are not extant (cf. biographical sketches by Stearns, West Amer. Sci. **3**: 223–227. 1887; Johnston, Contr. Gray Herb. **81**: 98–106. 1928; Jepson, Madroño **2**: 84–88. 1933). Isotype (in Herb. Hookerianum, Kew, England) studied. *Bridges 146*, distributed by Smiths. Inst., apparently not taken along with the type number, *Bridges 153*, since the former collection is distinctly hairy and represents a hirsutulous race. *Githopsis specularioides* var. *glabra* Jepson, Man. Fl. Pls. Calif. 974. 1925, based on *Geo. Hansen 494*, from Antelope, Amador Co., Calif. Isotypes studied.—Stems slender, divergent, striate, with a few long branches from the base, these openly or even laxly branching again, 8–20 cm. high; herbage glabrous or nearly so (somewhat setulose under binocular), hispidulose or setulose along the stem-angles, especially below; upper cauline leaves linear-oblong, serrulate, obtuse at the base, firmly rim-margined, the lower leaves all withered at anthesis; calyx-lobes linear, acicular and Phlox-like or subulate, 8–15 mm. long, shortly acute, the midnerve raised, in postanthesis the calyx-lobes in addition impressed-lineate, sometimes with a few bristle-like hairs about the sinuses of the lobes; corolla half again as long as the calyx, campanulate, deep blue, 15–17 (or 20) mm. long, the lobes shortly acute, apiculate, venose; capsule-tube broadest just above the middle, constricted at the summit, firmly to even deeply ribbed, essentially glabrous or retrorse-pubescent in age or in a hairy race; seed oblong or oval, bilaterally flattened, brown-shining, 0.8–1.0 mm. long.—Representative colls. CALIFORNIA. Amador Co.: Drytown, 500 ft., *Hansen 497;* [foothills], VI 1889, *E. L. Greene.* Calaveras Co.: Gwin Mine, 1100 ft., *Jepson 1783;* Angels Camp, 1200 ft., *J. P. Tracy 5688;* Vallecito, 1748 ft., 12 VI 1915, *A. L. Grant.* Tuolumne Co.: Chinese Camp, 30 V 1915, *A. L. Grant.* Stanislaus Co.: "California," 1854, *J. M. Bigelow;*[1] Waterford, *R. F. Hoover 1095;* Italian Bar, "wooded country," ca. 1600 ft., *Jepson 6372.* Mariposa Co.: Mt. Bullion, *Bolander 4853.*

An endemic species of the central Sierra Nevada foothills and middle elevations, *Githopsis pulchella* has a very restricted range, extending less than seventy miles in a north-south direction. This fact assists in the fixing of the probable origin of Bridges' type col-

county during his residence there, as for instance in Mohawk Valley, in the vicinity of Culvers Ranch, on May 28, 1889. His herbarium is now at Berkeley. His biography has been written by Jepson, Dict. Am. Biog. **11**: 162–163. 1933.

[1] Perhaps from vicinity of Knights Ferry, Stanislaus River. Cf. Pac. R. R. Rept. **4**: 116. 1857, where listed as *G. specularioides.*

lection. It is known that he visited the mining town of Silver Mt. and that he passed through the already famous Calaveras Grove of Big Trees en route (cf. Madroño **2**: 85). Another English collector, William Lobb, visited the Calaveras Grove of Big Trees in 1853, having heard certain preliminary reports of trees of incredible size at a meeting of the California Academy of Natural Sciences[1] early in the same year.[2] It was by Lobb's communication of cones and material that the English horticultural world was informed of the existence of these vegetable giants. This activity of Lobb doubtless interested Thomas Bridges in visiting the region for possible novelties prized by the horticulture of that day. The reference of Bridges to "Mariposa mountains" (Trans. Bot. Soc. Edinburgh **8**: 434–435. 1866) may involve this visit of 1857, the date recorded on the isotype of *Githopsis pulchella* at Kew, and may have included the known visit to the Calaveras Grove. In any case Bridges' material represents *Githopsis pulchella* in its typical phase as it occurs commonly in the foothill country of Calaveras and Mariposa counties.

Very few illustrations of *Githopsis* species are found in botanical literature. It is interesting that the first published drawing of any species of *Githopsis* is a good likeness of *Githopsis pulchella*, although it purported to be *G. specularioides*. This appeared with a note by N. E. Brown in the Gardeners' Chronicle (ser. 3, **16**: 244. 1894, as fig. 34) and was "of a plant in the Royal Gardens, Kew," the source of the cultivated subject not indicated. Upon examination of the preserved material, the basis of the illustration, the corollas, which were illustrated as of remarkable size and wholly unknown for *Githopsis specularioides*, show the plant to be *Githopsis pulchella*. Sir A. W. Hill writes that the source of the seed from which the plant was grown at Kew is unrecorded. Since *Githopsis pulchella*, surely an attractive annual, inhabits the very Mother Lode country, may the seed not have been sent to Kew by some appreciative gold-seeker far from his beloved England upon a stroll away from his diggings?

There is apparently a hirsutulose race of this species. Indeed, both glabrous and hirsutulose plants appear in the same colony as attested by such collections as *Tracy 5688* and *Grant* from Vallecito. The corolla-parts may vary away from the pentamerous condition to from 6 to 7 (*Jepson 6311* from Chinese Camp, Tuolumne Co.). The

[1] The name carried by the Academy at its inception.
[2] See H. G. Bloomer in Proc. Calif. Acad. Sci. **3**: 399–400. 1868.

corolla-color may vary from the usual deep blue to a light purple with a white throat. Nevertheless, the flower-size is distinctive for the genus, no other species having the showy if not handsome open corollas of *Githopsis pulchella.*

3. G. SPECULARIOIDES Nutt. Trans. Amer. Philos. Soc. n. ser. **8**: 258. 1843, based on a coll. by *Nuttall* from the "plains of the Oregon, near the outlet of the Wahlamet." We know that Nuttall made his headquarters during 1835 on Sauvie Island, then called Wappatoo Island, at the mouth of the Willamette River. Accordingly it seems likely that the type specimen was taken there. Type (in Brit. Mus. Nat. Hist., South Kensington) studied for me by Mr. George Taylor and compared with submitted collections from the region. Fragments of what is apparently the type coll. at Acad. Nat. Sci., Philadelphia.—Stems stout or firm, usually short and simple or a little branched from the base, angled below, terete above, 5–12 (or 18) cm. high; herbage gray-hispidulose; middle and upper cauline leaves inconspicuous, scattered, appressed to the stem, the blades cuneate-obovate, narrowed to the sessile base, 3-toothed at the summit and often with a pair or more of lateral serratures, 4–14 mm. long, the lowermost cauline leaves with shorter blades, more orbicular or ovate, early withering; flowers borne in upper stem-axils and terminal; calyx-lobes one-half to about equalling the corolla at anthesis, impressed-lineate and with a strong midnerve, linear-subulate, shortly acute or blunt, often toothed, firm and somewhat thickened, 6–10 mm. long, lengthening at post-anthesis, then 8–14 mm. long, permanently erect to somewhat flaring but never outwardly strongly sickle-curving; corolla salverform, less often campanulate, 4–7 mm. long, bright usually "deep" blue, the lobes acute; capsule striately ribbed, often deeply so, especially at maturity; seed ovoid, 0.5–0.8 mm. long, imperfectly triquetrous or compressed, smooth, shining, light brown. Representative colls. WASHINGTON. Whitman Co.: Wawawai, V 1898, *Elmer 1015;* Columbia Co.(?): foothills of Blue Mts., 15 V 1897, *R. M. Horner 323;* Klickitat Co.: Columbia R., VI 1883, *Suksdorf.* OREGON: Marion Co.: Silverton, 1871, *E. Hall 334;* Douglas Co.: along So. Umpqua, near Riddle, 5 VI 1930, *Henderson 12,989;* Crook Co.: Grizzly Butte, 13 VI 1894, *Leiberg 220.* CALIFORNIA: Humboldt Co.: Alder Pt. on Eel R., 500 ft., *Tracy 1906;* Kneeland Prairie, 2500 ft., *Tracy 2655;* Jarnigans, VII 1888, *Chesnut & Drew;* Mendocino Co.: Sherwood Valley, *Davy & Blasdale 5214;* Handleys, V 1903, *J. MacMurphy 23;* Eel R., 6 VI 1893, *Blankinship;* Sonoma Co.: fields east of Santa Rosa, *Heller & Brown 5308;* Napa Co.: Mt. St. Helena, 30 VIII 1888, *E. L. Greene;* Wooden Valley Grade, w. side of Napa Range, "on recent burn," *Keck 1022;* Santa Clara Co.: without further loc., *M. E. P. Ames* (ex Canby Herb.); "California," without further loc. but perhaps from this co., 1868–9, *Kellogg & Harford 618;* foothills w. of Los Gatos, *Heller 7339;* Monterey Co.: Tassajara Hot

Sprs., *Elmer 3140;* Santa Barbara Co.: Painted Cave Rch., *Eastwood 87* (uncertain coll.—to be looked for in Santa Ynez Mts.); Santa Cruz Isl., "steep open slope," 21 IV 1932, *Hoffmann* (small pls., 2–4 cm. high!); Siskiyou Co.: Yreka, 1876, *E. L. Greene;* Plumas Co.: Hospital Hill near Quincy, IV 1897, *Austin 1004;* Amador Co.: Lancha Plana, 400 ft., *Hansen 1271* (very dwarf); Tuolumne Co.: Grant Rch. near Columbia, 21 V 1915, *A. L. Grant;* Mariposa Co.: e. of Merced Falls, "grassy hillsides," *J. T. Howell 4159.*

G. SPECULARIOIDES subsp. **candida,** subsp. nov.—Planta altior, altitudine 15–20 cm. basi ramosissima, caulibus multis, quadrangulatis, infime angulato-hirsutulis, ceteroqui glabriusculis; foliis reductis, sessilibus, glabriusculis, laminis cuneato-ovatis, aliquantum serrulato; calycis tubo solum striato-sulcatis, laciniis linearibus, integerrimis, ciliatis, 5–8 mm. longis; corollis albidis, 4–5 mm. longis, calycis lacinias aequantibus; seminibus subtrigonis, 0.8–0.9 mm. longis, nitento-rubicundis.—TYPE: *Munz 9806* (Pomona Coll. Herb. 98396) taken on "gravelly burn in chaparral," 6 mi. n. of Santa Ysabel, San Diego Co., Calif., 19 V 1925. ISOTYPE in Univ. Calif. Herb., Berkeley. OTHER COLLS.: Riverside Co.: 10 mi. s. of Hemet, *Munz 10,807;* San Diego Co.: Cuyamaca Lake, 4750 ft., *Munz 9753;* 1 mi. s. of Morettis, 19 V 1925 *Peirson.*

This species is considered beyond under the section Discussion.

4. G. CALYCINA Benth. Pl. Hartw. 321, 1849, based on *Hartweg 317,* from Sacramento Valley (cf. Jepson, Erythea **5**: 31–5, 51–6, 1897, as to Hartweg's localities in California). Notes upon type (in Herb. Benthamianum, Kew) and comparisons with recent collections made for the author in 1935 by W. L. Jepson. This type is discussed below. *G. calycina* var. *hirsuta* Benth., l. c., based on *Hartweg 416* from same locality as type of the species and probably taken along with it. This name is a *nomen nudum* with only the implication of its nature resting upon Bentham's choice of varietal name. The type consists of four plants differing from the species only in their markedly pubescent condition.—Plants of spreading somewhat bushy habit, 8–25 cm. high, the stem stout, strongly angled throughout, usually much branched from the base or less often only from above with spreading branches, these proximally horizontal and distally ascending or up-turned at their tips; herbage at first downy then early prevalently gray scabrous-hispidulose with abundant but scattered spreading or retrorse hairs; middle and upper cauline leaves scattered, the blades narrowly oblong or less often ovate, especially below, 8–12 (or 16) mm. long, strongly serrulate, hirsutulous, at length glabrate; flowers both axillary and terminal, large and conspicuous (for the genus), especially in a large-flowered race; calyx-tube slender-conic, clearly ribbed, 4–6 mm. long at anthesis, accrescent, glabrate, the lobes linear-subulate, acuminate or abruptly acute, 6–12 mm. long at anthesis; corolla nearly two-thirds length of calyx-lobes, cylindro-campanulate, 6–10 mm. long, bright dark blue fading whitish; capsule firm, subcoriaceous, the

calyx-lobes then 12–20 mm. long and widely outwardly spreading; seeds elliptical, lenticular, 0.8 mm. long, smooth, chestnut-brown. Representative colls.: OREGON: Jackson Co.: Wimer, 24 IV 1889, *E. W. Hammond 252.* CALIFORNIA: Mendocino Co.: Anderson Valley, 18 V 1866, *Bolander 4797;* Siskiyou Co.: Oro Fino, *Geo. D. Butler 613;* Shasta Co.: Pit R. Ferry, *H. E. Brown 257;* Redding (7 mi. from, on Alturas Hgy.), *R. F. Hoover 2279;* Tehama Co.: Stivers Rch., 25 IV 1899, *Jepson;* 2 mi. s. of Red Bluff, "low places in a grain field on a treeless plain, red clay soil," *Heller 12,327;* Plumas Co.: Round Valley, 1866, *Bolander 4693;* Marston sta. 3500 ft., *Heller 10,840* (good match for type of var. *hirsuta*, fide Jepson); Lake Co.: Lakeport, *C. F. Baker 2956;* Napa Co.: Napa R. basin, IV 1893, *Jepson;* Solano Co.: Walker Canyon, Vaca Mts., *Jepson 14,772;* Contra Costa Co.: Clayton, 16 IV 1889, *Chesnut & Drew;* Tuolumne Co.: Columbia, *Jepson 6336;* Calaveras Co.: Avery, *W. W. Eggleston 9196;* Stanislaus Co.: Woodward Reservoir n. of Oakdale, *R. F. Hoover 1937.* Intermediate coll. between *G. calycina* and *G. pulchella:* Warnerville, Stanislaus Co., Calif., *R. F. Hoover 1037* (possibly a hybrid). Large-flowered race of *G. calycina:* Butte Co.: Richardsons Sprs., *Heller 11,423;* Berry Canyon near Clear Creek, *Heller & Brown 5548;* same loc., *Heller & Brown 5491* (coll. in fruit, very variable among herbaria); 3 mi. n. of Chico, *R. F. Hoover 2236;* Iron Canyon, V 1896, *Austin 286;* fields near Chico, 25 IV 1897, *Austin 1832.*

This large-flowered race of *Githopsis calycina*, known only from Butte County, can be contrasted with the typical phase of the species as follows:

Typical G. calycina	Large-flowered race
Corolla scarcely showy, the lobes shorter than or equalling the calyx-lobes in anthesis.	*Corolla* showy, the lobes mostly exceeding the calyx-lobes in anthesis.

The author finds that the hirsute forms vastly outnumber the glabrate plants. Glabrous and the more usual hirsute plants often occur together in compact populations suggesting their origin from a single capsule. Bentham's variety *hirsuta* would, then, seem to be the prevalent biological phase of the species, with the glabrous nomenclatorially "typical" plants decidedly in the minority. It is pointless at this time to divide the species subspecifically upon the basis of pubescence. As for the type of var. *hirsuta* Dr. Jepson has recorded the pubescence as "rough, scaberulous, with short stiff spreading hairs often thickened or broadened at the base, markedly retrorse on calyx-tube, mostly spreading on calyx-segments."[1] The stems are chiefly, though not wholly, pubescent on the angles.

[1] Memorandum in Jepson Herb. accompanying *Jepson 6336*, Columbia, Tuolumne Co., compared with the type.

Bentham in describing this species writes "calycis tubus. . . . post anthesin elongatus, profunde 10-striatus." Although but one flower was sufficiently mature to show the condition well, the fruiting calyx on the type shows *strong* ribs and not mere striae. This character is not confined to the type collection but the species over its whole range has a distinctly ribbed, not merely striated, calyx-tube.

The effect of microclimates upon vernal annuals is well shown by *Githopsis* species. *Githopsis calycina* as it grows in the foothills of Butte County, California, may in one small ravine be in late fruiting stage on May 8th (e.g. *Heller & Brown 5491* from Berry Canyon) while on an adjoining hillslope one may collect six days later, on May 14th, plants in early anthesis (e.g. *Heller & Brown 5548* from same loc.). To one familiar only with a steady progression of flowering periods, what Setchell has called "waves of anthesis," this sounds incoherent and baffling. Yet while this vaster phenomenon is going on over wide biotic and climatic areas this important minor effect of microclimates is operating in more limited habitats, such as a single slope of a mountainside or a small ravine.

5. G. DIFFUSA Gray, Proc. Am. Acad. **17**: 221. 1882, based on *Parish Bros. 830* from Cucamonga Mt., San Gabriel Mts., VI 1881. Notes upon type (in Gray Herb.) communicated by C. A. Weatherby. Isotypes (in Dudley and U. S. National herbaria) studied.—Plants of slender strict habit, the stems simple or sparingly and openly branched above, 10–20 (or 30) cm. high; herbage wholly glabrous except for slight ciliation at the base of the calyx-lobes; cauline leaves obovate, crenulate or serrulate, 4–7 mm. long, plane-margined, commonly not withered at anthesis; flowers few, scattered, borne in uppermost axils; calyx-tube linear, slightly enlarged at the summit, 4–8 mm. long, 5-nerved, not at all ribbed, glabrous, the lobes linear, thin, plane, acute, rarely with a few lateral teeth, erect; corolla subcylindrical, light purple, 3–5 mm. long, the lobes acute, about half as long as the calyx-lobes; capsule but little enlarged over the flowering calyx, 5-nerved, glabrous, the calyx-lobes then spreading but straight; seeds ovoid, 0.6–0.8 mm. long, subterete, smooth, shining, light brown.—Collections examined: CALIFORNIA. Los Angeles Co.: "near Los Angeles" [Mt. Wilson, as determined by his itinerary (Ewan mss.)], 1892, *A. Davidson* (U. C. Herb.); Mt. Wilson trail, 2500 ft., 12 VI 1892, *A. Davidson* (reported in Erythea **2**: 84); one-half mile below Sturdevants, San Gabriel Mts., 3500 ft., *Peirson 1208* ("not common but at this location it was abundant for a considerable distance. Growing on shaded rather moist banks," note in Jepson Herb.); Bear Canyon trail to summit of Mt. San Antonio, *T. Craig 412;* San Bernardino Co.: Lower San Sevaine Flats, 4700 ft., *Johnston* 10 VII 1925 ("one plant at edge of runway below spring hole").

Githopsis diffusa as now known is a narrow endemic of the San Gabriel Mts. What may prove to be this species when more collections are available has been taken in the Vaca Mts. of Solano County, in the North Coast Ranges (Walker Canyon, 17 V 1892, *Jepson s. n.*). Collections of this species are rare in herbaria; the plant is delicate and growing as it does on shaded banks it is doubtless easily overlooked rather than actually absent from its localized habitats. In many of its characters *Githopsis diffusa* more closely resembles *G. specularioides* than it does its sister endemic *G. gilioides*, herein described as new.

6. G. **gilioides** Ewan, sp. nov. Planta humilis depresso-globosa altitudine 6–10 cm. basi ramosissima, caulibus subangulatis praesertim infimo striato-hirsutulis; foliis imprimis cuneato-ovatis, sessilibus, paginis ambobus saepius hirsutulis interdum glabriusculis, marginibus tenuibus nullo modo callosis; floribus sessilibus calycis tubo retrorse hirtello interdum glabriusculo laciniis acuminatis; corollis 4–5 mm. longis calycis lacinias aequantibus; seminibus ellipticis fuscis, 0.7–0.9 mm. longis, subcylindratis nullo modo angulatis.—Type: *Peirson 5780* (U. C. Herb. 530091) taken on chaparral "burn," Forks of San Gabriel River, Los Angeles Co., 1750 ft., 23 IV 1925. Other Colls.: San Gabriel Canyon, 1600 ft., *Munz 9436;* San Antonio Canyon, dry sunny flat, 4200 ft., *Wheeler 783* (less branching, more strict than other colls.).

Githopsis gilioides, the most leafy species of the genus, is remarkable for the exceptional branching character of the plants, giving a bushy, somewhat compact habit to the species. This leafiness might be accounted for upon ecological grounds, as representing a very luxuriant phase of *G. diffusa*, were it not for the fundamental differences in flower-characters setting this species apart from other members of the genus. Plant species occupying "burns" often show notable vigor in their vegetative growth but do not exhibit alterations in their floral morphology.[1]

Like *Githopsis diffusa* this species is of interest to the plant geographer for its highly localized distribution, being confined to the San Gabriel Mts. of southern California. This mountain range, the subject of an extended botanical survey by the author to appear else-

[1] T. S. Brandegee reported in Zoe 2: 120. 1891, *Campanula exigua* to "grow to a much greater size than usual" on a Mt. Tamalpais "burn" but apparently without morphological alteration. On the other hand plants growing on unburned areas in deep soils rich in the requisite nutrients *of the particular species* may assume the characteristic luxuriance of "burn" specimens. Every exceptional specimen cannot, therefore, be assigned to the effects of fires.

where, has been a center of origin for some seventeen species and subspecies of plants endemic to it.

7. G. **filicaulis** Ewan, sp. nov. Planta delicatula altitudine 10–25 cm. basi aliquantum ramosa et divaricata, caulibus paucis filiformibus elongatisque subvolubilibus angulatis striato-hirsutulis; foliis inconspicuis subsessilibus laminis ovato-oblongis marginibus serrulatis glabriusculis 1–3 mm. longis; floribus minutis sessilibus calycis tubo leviter striato glabriusculo 3–5 mm. longis, laciniis linearibus acutis; corollis minutissimis, calycis laciniis brevioribus; seminibus lineari-ellipticis, apicibus ambobus acutis, 0.6–0.9 mm. longis nitento-rubicundis.—Type: *C. R. Orcutt* coll. (U. S. Nat. Herb. 1402913) taken at Mission Canyon, San Diego, Calif., 8 V 1884. Isotype (in U. C. Herb.) studied. Additional Coll.: Mexico: Lower California: near Vallecito, 22 V 1886, *C. R. Orcutt.*

Githopsis filicaulis, the most slender species of the genus, follows a pattern for endemic species of many genera inhabiting San Diego County in having smaller floral parts than its relatives to the north. That is, in a given genus having several species well distributed over California, it is not uncommon to find a member showing diminutive flower-parts, often the smallest flowers of the species-group, inhabiting the extreme southern part of the state. It is sometimes a single species in a genus of perhaps half a dozen California members, such as the present genus *Githopsis;* again it may be only a subspecies or merely a well-marked race of a widely distributed species. To illustrate: *Delphinium Parryi* and *Calochortus albus* each have a small-flowered race in this region. The variety *sanguinea* of the widespread *Monardella lanceolata* represents another example of this phenomenon.

Discussion

Fernald has suggested that four closely related species of the genus *Sabatia,* section *Pleienta,* have presumably all evolved from a common ancestor which once grew on the coastal plain of southeastern North America. The four species now occupy almost completely discrete but contiguous areas within the range of the ancestral species.[1] Speciation in *Githopsis* may have come about by a like fragmentation of a once widespread ancestor, conceivably resembling *Githopsis specularioides.* This prototype, then, occupied the whole of the inhabitable valleys and lower foothills of the Pacific Coast during late Tertiary time, since the whole nature of the plant—its habit, its gross morphology and habitat-preference today—lead one to conclude

[1] See map, Fig. 188, in Sinnott, *Botany: Principles and Problems,* ed. 3, 1935.

it may have appeared with the increasing aridity and emergence of land characteristic of that era. Today the plant is a subxerophyte with a brief life-span, ideally adapted to the wet winters and early-dry summers of its habitats. *Githopsis* represents an upland type from the paleo-ecological standpoint rather than a plant of marshy or moist situations so often favored by members of this family. The great development of the genus *Crataegus* in North America is suggested by Marie-Victorin in his *Flore Laurentienne* as a direct result of the disturbance of the ecological equilibrium. *Githopsis* may similarly have arrived at its far more modest deployment into species.

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Dates of Boeckeler's Cyperaceae.—Otto Boeckeler's "Die Cyperaceen des Koeniglichen Herbariums zu Berlin" appeared in scattered numbers of the journal "Linnaea," and comprised descriptions, together with synonymy, of species then in the Herbarium of the Royal Botanical Garden at Berlin. Recently it has been my good fortune to acquire a copy of Boeckeler's work including, to a large extent, the original wrappers. The following dates with pagination for the various parts can therefore be cited:

Title page of "Linnaea"	vol. xxxv.	1867–1868.	397–512.	Wrapper lacking.
			513–612.	November 1868.
	vol. xxxvi.	1869–1870.	271–384.	January 1870.
			385–512.	April 1870.
			691–768.	December 1870.
	vol. xxxvii.	1871–1873.	1–544.	February 1871.
			545–647.	September 1873.
	vol. xxxviii.	1874.	223–256.	Wrapper lacking.
			257–384.	May 1874.
			385–512.	July 1874.
			513–544.	Wrapper lacking.
	vol. xxxix.	1875.	1–152.	February 1875.
	vol. xl.	1876.	327–384.	August 1876.
			385–452.	December 1876.
	vol. xli.	1877.	145–192.	February 1877.
			193–288.	April 1877.
			289–356.	August 1877.

—H. K. Svenson,
Brooklyn Botanic Garden

Corynephorus canescens on western Long Island.—On the sandy waste lands bordering Jamaica Bay, especially near Cross Bay Boulevard, Queens, this silvery-tufted annual grass has become exceedingly abundant. The seventh edition of Gray's Manual does not include it, but in Hitchcock's Manual of Grasses (1935) *Corynephorus* is treated as a ballast plant adventive from Europe at Philadelphia, Camden, Long Island, and Martha's Vineyard.—H. K. Svenson, Brooklyn Botanic Garden.

SOME WOODY PLANTS OF RHODE ISLAND

Ernest J. Palmer

During the summers of 1937 and 1938 I made several short excursions into Rhode Island for the purpose of adding to the very incomplete set of the woody plants of the state in the herbarium of the Arnold Arboretum. The flora of this small and accessible state has been so thoroughly explored that new discoveries could scarcely be expected. However, several plants were found that are not mentioned in the rather complete list of the state flora published by J. L. Bennett half a century ago,* and some of them do not seem to have been reported elsewhere. Most of the plants noted here are of species and varieties that have been recognized as distinct in recent years, and this is the case also with the three hybrid oaks.

About 200 species and varieties of woody plants have been recorded from Rhode Island in previous publications that I have seen. A total of 151 species and varieties were collected on my various trips, including six introduced plants. All parts of the state were visited, but little collecting was done in Newport County on account of continuous rain at the time I was there.

One of the surprising features of the state flora, in contrast with that of surrounding regions, is the scant representation of the genus *Crataegus*. Thorns may be more abundant in some sections that were not visited, especially in the southeastern part; but only three species are represented in my collections, and all of these appear to be rather rare. The species found are *Crataegus macrosperma* Ashe, *C. intricata* Lange, and *C. pruinosa* (Wendl.) K. Koch. Other species represented in the herbarium of the Arnold Arboretum by previous collections are

* Plants of Rhode Island, J. L. Bennett, Proc. Providence Franklin Soc. 1888.

Crataegus dilatata Sarg., *C. chrysocarpa* Ashe var. *phoenica* Palmer, *C. Holmesiana* Ashe, and *C. macracantha* Lodd., all of which are from the vicinity of Tiverton. *Crataegus crus-galli* L. and *C. punctata* Jacq. have also been reported from Rhode Island, and both are probably found in the state, although I have seen no specimens.

Ten species of *Rubus* were collected, of which the following are of interest as not having been mentioned in the Bennett list: *Rubus setosus* Bigel. (Slatersville), *R. multispinus* Blanchard (Cumberland Hill, North Scituate), *R. arenicolus* Blanchard (Wallum Pond), and *R. laciniatus* Willd. (Wallum Pond). The last, an introduced species, was abundant locally in wet rocky woods a little way back from the east shore of the pond.

Salix Bebbiana Sarg. was found near Smithfield and North Scituate, and *S. discolor* Muhl. var. *eriocephala* (Michx.) Anders. at Exeter. *Carya ovalis* (Wang.) Sarg., collected at Slatersville, and *C. ovalis* var. *obovalis* Sarg., near Tiverton, were both probably included under *Carya microcarpa* Nutt. of earlier lists.

The chestnut (*Castanea dentata* (Marsh.) Borkh.), once a common and stately tree in the woods of Rhode Island and throughout New England, is now represented only by sprouts from old stumps making a persistent fight against the blight. But it is interesting to note that here as in some other localities the species seems to be far from extermination, and there may be a possibility that some strain will develop immunity and outlive the blight. On a rocky slope above Sneech Pond, near Cumberland Hill, second growth plants were found that were 20 or 25 feet in height and bearing numerous fruiting burs.

Eight species and three hybrid oaks were collected on my various trips. The post oak and the pin oak and the hybrid, × *Quercus runcinata* Engelm., reported on the Bennett list, were not seen, but three additional hybrids were found. × *Quercus Rehderi* Trelease was collected near Slatersville under my number 43296, July 17, 1937. This is the hybrid between *Quercus ilicifolia* and *Q. velutina*, both of which were abundant in the vicinity, and several of the hybrids were seen. Near the same place a single specimen of × *Quercus Robbinsii* Trelease (*Q. coccinea* × *Q. ilicifolia*) was found. This was collected under number 43352, July 17, 1937. × *Quercus Saulei* Schneider (*Q. alba* × *Q. montana*) was found near Durfee Hill, south of Chepachet. The collection number is 44641, Aug. 20, 1938. The chestnut oak (*Quercus montana*) is a rather uncommon and restricted species, but it was

found growing abundantly on the north side of Durfee Hill—said to be the highest point in Rhode Island—in 1937. The locality was not thoroughly explored at that time on account of rain, but as the white oak was also growing there, and as the species seem to hybridize rather frequently, a special effort was made the following year to find the hybrid. Going south from Chepachet on U. S. highway 102, at a point about half a mile north of where the local road turns off for Durfee Hill, *Quercus montana* was quite abundant on both sides. On the east side of the highway there is a gradual wooded slope with loose boulders and outcrops of bedded schistose rock, and on one of the larger of these outcrops in a group of mostly shrubby or stunted chestnut and white oaks, a specimen was found that was an evident hybrid between the two species. The tree, about 20 or 25 feet in height, was apparently a rather old specimen, but it was not fruiting at the time of collection, although most of the chestnut oaks bore acorns.

Specimens of the three hybrid oaks are deposited in the herbarium of the Arnold Arboretum and in the herbarium of the New England Botanical Club.

ARNOLD ARBORETUM.

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